DOMESTIC ENGINEERING

Whole Number 141 *Chicago and New York, July Fifteenth, Nineteen Hundred and One* *Vol. 21, No 4*

NEW YORK, BOSTON, MINNEAPOLIS, DENVER, PHILADELPHIA, ST. LOUIS, LONDON, HAMBURG **AMERICAN RADIATOR CO.** GENERAL OFFICES LAKE & DEARBORN STS. CHICAGO.

GLAUBER STOP COCKS
GLAUBER BATH COCKS
GLAUBER FULLER WORK
GLAUBER BASIN COCKS
GLAUBER COMPRESSION WORK
GLAUBER WASH TRAY BIBBS
GLAUBER SOLDERING NIPPLES
GLAUBER MAGIC BASIN CLAMPS
GLAUBER CURB COCKS
GLAUBER RUBBER ELBOWS
GLAUBER SILL COCKS
GLAUBER HOSE BANDS
GLAUBER BRASS MFG. CO CLEVELAND
GLAUBER CATALOGUE D 1901

PATTERNS
GOBEILLE PATTERN CO. Cleveland, O.

BUFFALO FORGE COMPANY
Disc Wheels
Pulley - Steam - Electric
FOR
EXHAUST VENTILATING & COOLING
Buffalo Forge Co., Buffalo, N.Y.

The Pattern Shop of the East
H. B. OLMSTEAD & CO.
87 FRANKFORT ST. NEW YORK

F. E. Cudell's
PATENT
sewer gas and back-water **trap**

for wash bowls, sinks, bath and wash tubs

Put into the White House by the U. S. government. For venting use vent trap.

CLEVELAND, OHIO

WATER SUPPLY BIG VOLUME LIFTS
L. E. RHODES CO. HARTFORD, CT.

See our Advertisement...Page 183

WHAT A DIFFERENCE
In the quality of Plumbing work.
RAYMOND'S

COMBINATION FERRULES MAKE RELIABLE CONNECTIONS BETWEEN LEAD AND IRON PIPES.

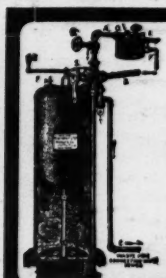
WHY ?

Because they have an extra thickness of lead over the shoulder, giving strength where it is needed, and where other Lead Ferrules are weak.

The genuine article bears our label.

RAYMOND LEAD COMPANY, CHICAGO.

—JENKINS' '96 PACKING—
Pronounced by steam users throughout the world the best joint packing manufactured. Expensive? Not at all, as it weighs 30 per cent less than many other packings, consequently is much cheaper.
JENKINS BROTHERS, New York, Philadelphia, Chicago, Boston.



Constructed under the Jewell Warren Continental & Hyatt Patents
GRAVITY AND PRESSURE FILTERS
WRITE FOR CATALOGUE
New York Continental Jewell Filtration Company
40-42 W. Quincy St., CHICAGO. 15 Broad St., NEW YORK.

SEE ADV. ON PAGE IV
Paragon Boiler
ISAAC A. SHEPPARD & CO., - PHILADELPHIA

LIGHTED BY FRINK REFLECTORS.
THE ART INSTITUTE OF CHICAGO
I. P. FRINK, 551 Pearl ST., NEW YORK

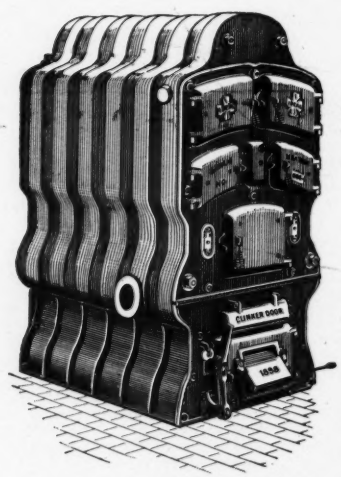
Mantle Chemicals
The Roessler & Hasslacher Chemical Co.
Office: 100 William St., New York.
Chicago Office: 16 N. Clark Street.

"Things small, but significant, soon become important."

We feel that the many little important improvements made in

our 1901 line

of Ideal Boilers will strengthen and continue the high regard in which they are held by those who appreciate the fine points in boiler construction. May we furnish you our latest descriptive catalogue and prices?



AMERICAN RADIATOR COMPANY

Lake and Dearborn Streets

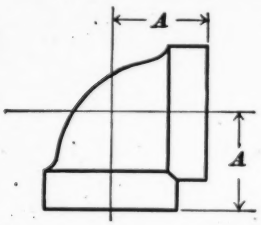
CHICAGO

NEW YORK
BUFFALO
MINNEAPOLIS

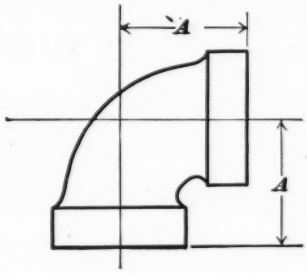
PHILADELPHIA
ST. LOUIS
DENVER

CRANE DRAINAGE FITTINGS

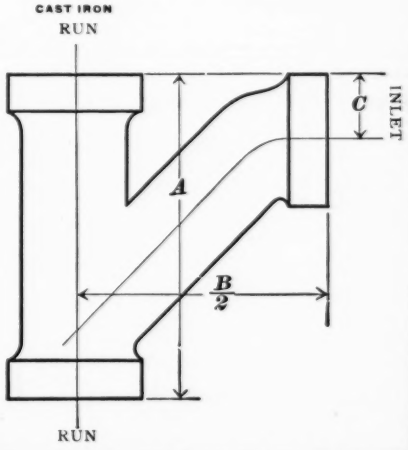
FOR THE WROUGHT PIPE SYSTEM OF DRAINAGE



THESE FITTINGS ARE MADE WITH AN INSIDE SHOULDER. THE PIPE SCREWS IN UP TO THE SHOULDER, MAKING A PERFECTLY FLUSH JOINT, THUS LEAVING NO POCKETS FOR SOLID MATTER TO LODGE IN AND CHOKE UP THE PIPE.



GALVANIZED AND MALLEABLE IRON DRAINAGE FITTINGS MADE TO ORDER

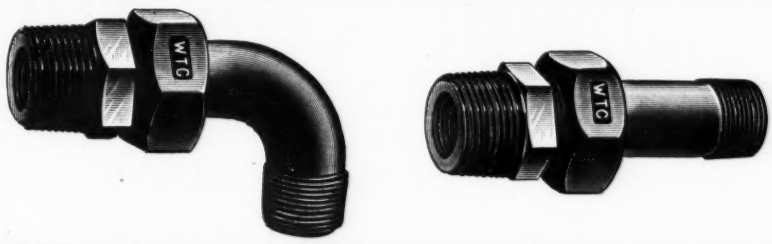


SEND FOR SPECIAL DRAINAGE FITTING CIRCULAR AND ILLUSTRATED AND DESCRIPTIVE CATALOGUE.

NEW YORK
PHILADELPHIA
CINCINNATI
KANSAS CITY
SIOUX CITY
OMAHA

CRANE CO.
CHICAGO
ESTABLISHED 1855

ST. PAUL
ST. LOUIS
LOS ANGELES
SAN FRANCISCO
PORTLAND, ORE.

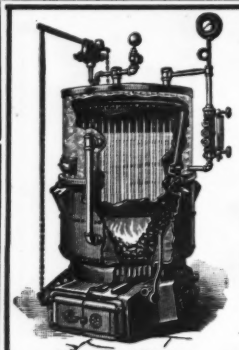


The "Kewanee" Boiler Coupling

BRASS and Iron Ball Joint Coupling. The coupling is brass, the ring and bottom piece malleable iron galvanized.

A coupling having all the advantages of a connection requiring no gasket to make a tight seal—besides a screw joint of different metals, thereby non-corrosive. The feature of an iron ring screwed to brass makes it possible to disconnect without injury to the ring.

WESTERN TUBE COMPANY
KEWANEE, ILL.



Hard Coal Boiler

The Gorton Side Feed Boilers

INSURE A WARM BUILDING DAY AND NIGHT
IN THE COLDEST WEATHER

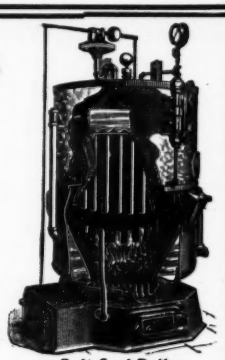
Our book, "MODERN HOUSE HEATING," gives the information. Mailed Free.

Send for a Copy and investigate for yourself.

Gorton & Lidgerwood Co.

96 Liberty Street, New York

77 Oliver St., Boston, Mass. Old Colony Building, Chicago Prudential Bldg., Atlanta, Ga.



Soft Coal Boiler

The Paragon Steam Generator is for heating by steam, the **Paragon Hot Water Circulator** is for heating by hot water. Each has been designed for the special work it will be called upon to do. Many manufacturers, to save pattern costs, make the same section answer for both purposes. We prefer to go to the extra expense of different patterns in order to get the best possible results from each system of heating. Don't use a makeshift.

ISAAC A. SHEPPARD & CO.

NEW YORK PHILADELPHIA BALTIMORE

TROUBLE WITH YOUR LIGHTS? NOT IF YOU USE

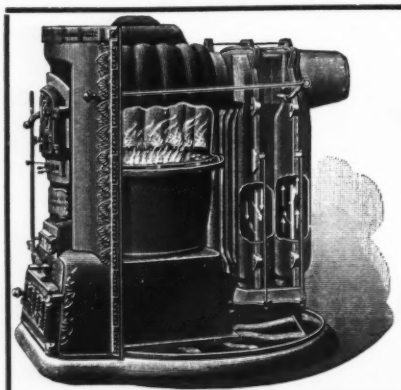
Cosmo Cap Mantle

Needs No Adjusting. Fits Any Incandescent Burner.

For Sale at all dealers **PRICE, 25 CENTS** Made by the

Cosmopolitan Incandescent Gas Light Co.

170 EAST MADISON STREET, CHICAGO



BENGAL FURNACE

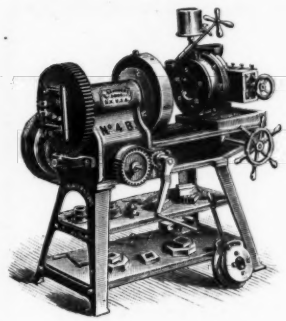
THE WONDER OF 1901 **IT HAS NO COMPETITOR**

DON'T KICK if your delay in securing the Agency for this Furnace has enabled the other fellow to get it. This is the opportunity of your life to secure the sale of the Best and Most Popular Furnace Made. The Bengal does the work, saves fuel, satisfies the customer, heats the house and NOT the chimney.

FLOYD, WELLS & CO., ROYERSFORD, PA.

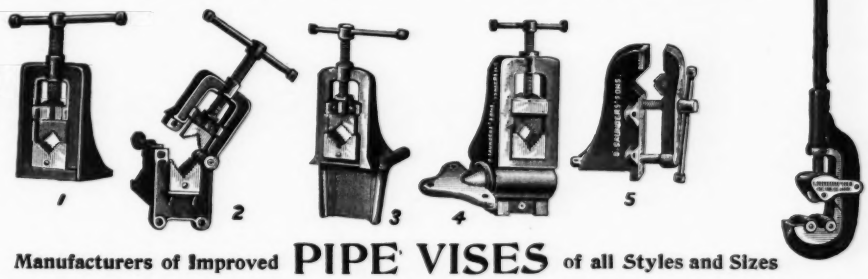
EASTERN SELLING AGENTS,

GURNEY & CO., WASHINGTON, HANOVER, & ELM STS., BOSTON, MASS.



No. 4 B. Pipe Cutting and Threading Machine, ½-inch to 4 inches. Hand or Power.

D. SAUNDERS' SONS

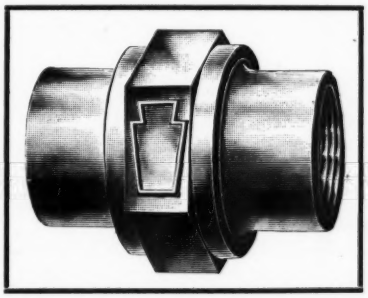


Manufacturers of Improved **PIPE VISES** of all Styles and Sizes

Holding one-eighth to eight inch pipe, made of malleable iron cast iron and steel. Also **Pipe Threading Machines** ¼ to 16-inch; Hand Pipe Cutters, Stocks and Dies, Tapping Machines, etc.

SEND FOR CATALOGUE. **35 ATHERTON STREET, YONKERS, N. Y.**

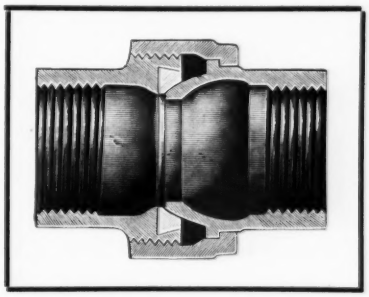
KEYSTONE UNIONS



Malleable Iron,
WITH
SOFT METAL SEAT
Are Always Tight.

MANUFACTURED BY

Stanley G. Flagg & Co.
NEW YORK PHILADELPHIA



WALLACE L. PIERCE, PRESIDENT
GEO. B. LITTLE, VICE-PRESIDENT

OSBORN B. HALL
GEN'L MANAGER MECHANICAL DEPT.

GEO. T. COPPINS, SECRETARY
GEO. H. GRAVES, TREASURER

Walworth Manufacturing Co.

TOOLS AND SUPPLIES

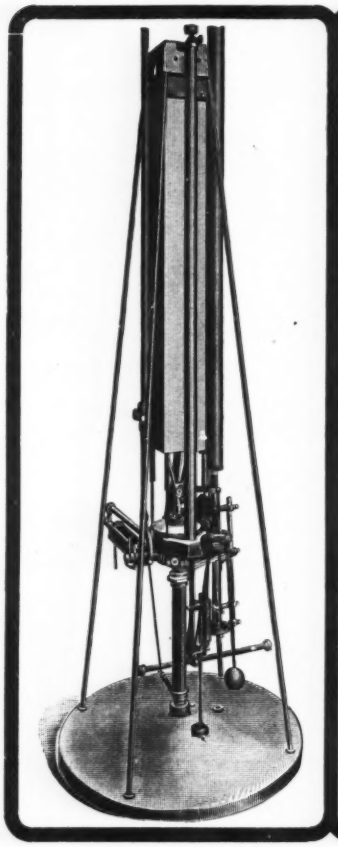
FOR STEAM, WATER AND GAS USERS

ESTABLISHED
1842

INCORPORATED
1872

128 TO 136 FEDERAL STREET
BOSTON, MASS., U. S. A.

NEW YORK OFFICE, PARK ROW BLDG.
FACTORY, SOUTH BOSTON



"The light so bright that birds will sing and say it is not night."

Agents Wanted

To Handle the

U.L. Generator

Generating from 1 to 50 lights of 100 candle power. Lights may be turned on or off in any room on any floor like gas jets. Automatic, self regulating generator.

Price, $125.00

Liberal Discounts to Agents. For Terms and Territory address

Universal Light Co.

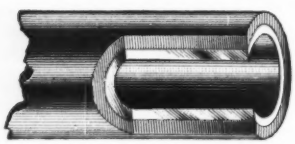
26-28 North Canal Street Chicago, Illinois

Simple and Safe

No Competitors

A Big Money Maker

Gasoline Tank may be placed 100 feet from Generator



L.&R. Patent Pipe

Tin-Lined Iron Pipe for Pure Water

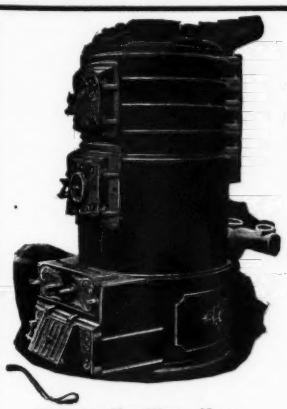
Cheaper than brass, about as cheap as lead, and SAFE
No brass or lead poisoning

SOLID. The Lining CANNOT BE SEPARATED from the Pipe even by Bending or Hot Water.

ALSO LEAD-LINED IRON PIPE MADE THE SAME WAY

LAMB & RITCHIE

CAMBRIDGEPORT, MASS.



400 Series Hot Water Heater.

Doric Hot Water Heater.

EVERY EFFORT COUNTS

If you expect to be successful you must expend your effort on a worthy object. It is useless to attempt to sell more heaters if those you've already placed fail to fulfill expectations. For such effort is wasted effort.

There is, however, a decidedly better way, namely, to push

"GURNEY"

...HEATERS...

For then you're handling a heater worthy of your best efforts. The "Gurney" Heater will do everything we claim for it, for the simple reason that we have constructed it so that it should attain just that end.

Naturally, it's profitable to handle, not only because each sale affords a satisfactory margin, but more so because each "Gurney" placed is the spokesman for several other sales.

We're always on the lookout for energetic agents, for dealers who are anxious to make more money than they are now making. Does that mean you? Then write us. Latest trade catalogue on request.

Gurney Heater Mfg. Co.

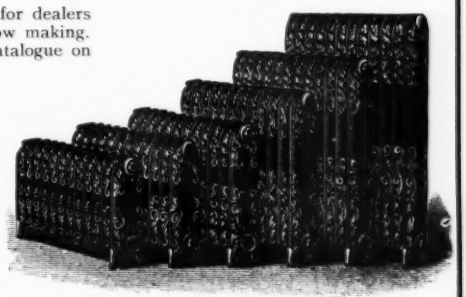
74 Franklin Street, Boston.

111 Fifth Ave., New York.

WESTERN SELLING AGENTS,

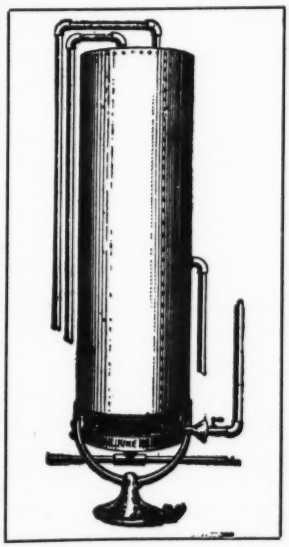
Jas. B. Clow & Sons, 222 to 224 Lake Street, Chicago, Ill.

Bright Idea Steam Boiler.



Duet Radiators for Hot Water and for Steam.

THE A. HELLER HEATER



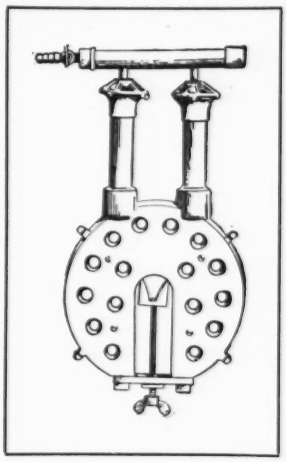
A GAS WATER HEATER

Is just the thing your Customer wants. It's the most Economical and Common Sense Heater ever put on the Market. It will supply the Kitchen and Bathroom with hot water. This heater is attached to the kitchen boiler and takes the place of the kitchen range as far as water heating is concerned, allowing the hot fire in the range to be dispensed with during the summer months. If a gas stove is used when cooking this heater will furnish hot water when wanted.....

PERFECT COMBUSTION NO ODOR

NO DIRT NO SMOKE

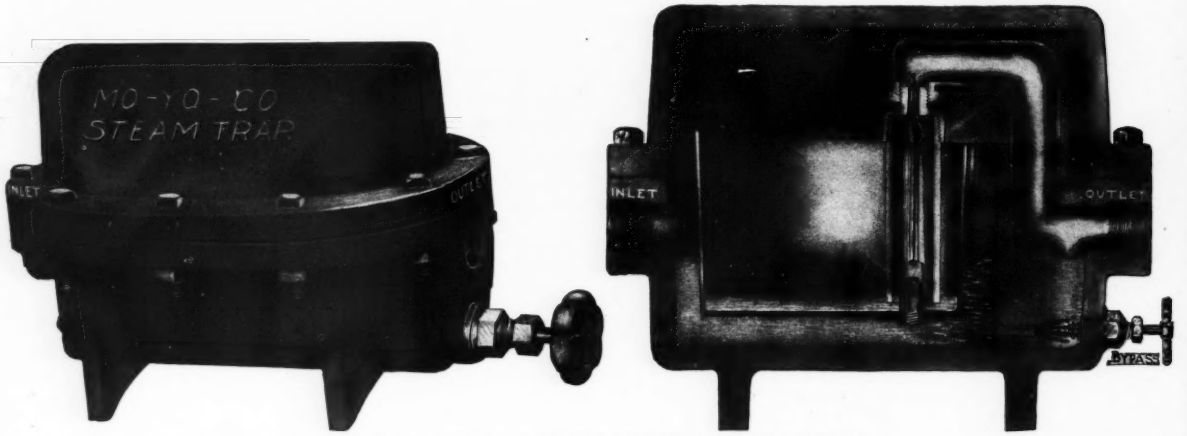
Heats in less time, and for less cost than any gas or coal stove in the market.....



SOLD TO THE PLUMBING TRADE ONLY---- WRITE FOR CIRCULARS AND PRICES

J. P. B. SADTLER & CO., 813 SOUTH HOWARD STREET, BALTIMORE, MD.

Mo=Yo=Co Steam Trap

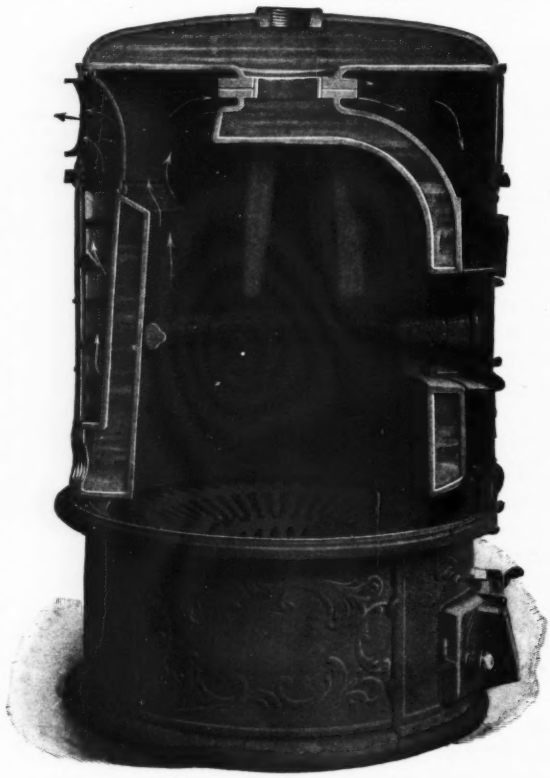


A GOOD TRAP FOR LITTLE MONEY

Monash=Younker Co.

MAKERS

43-45 Centre Street, New York. 201-207 S. Canal Street, Chicago.



Henderson Orbis Heaters

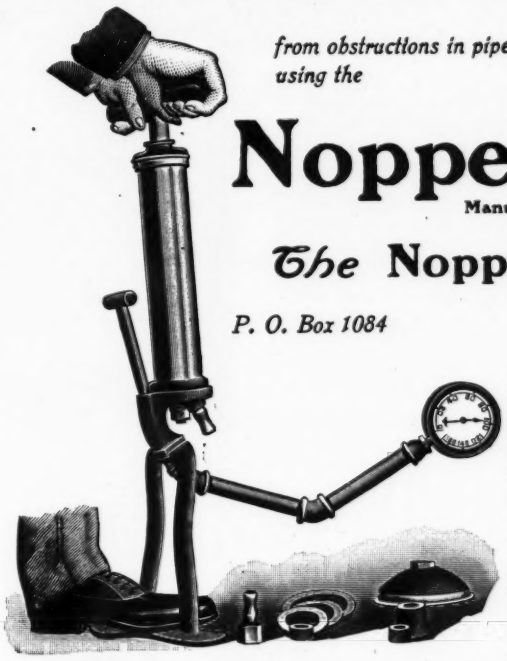
Designed especially for the **economical** heating of comparatively small buildings, and sold at a price compatible with the class of work it is intended for. Made in two styles and ten sizes for each, water and steam. Capacities: Water, 350 to 900 feet; steam, 210 to 550 feet.

A MOST EXCELLENT HEATER
AT A REASONABLE PRICE.....

The Prizer=Painter Stove & Heater Co.

Reading, Pa.

No More Trouble



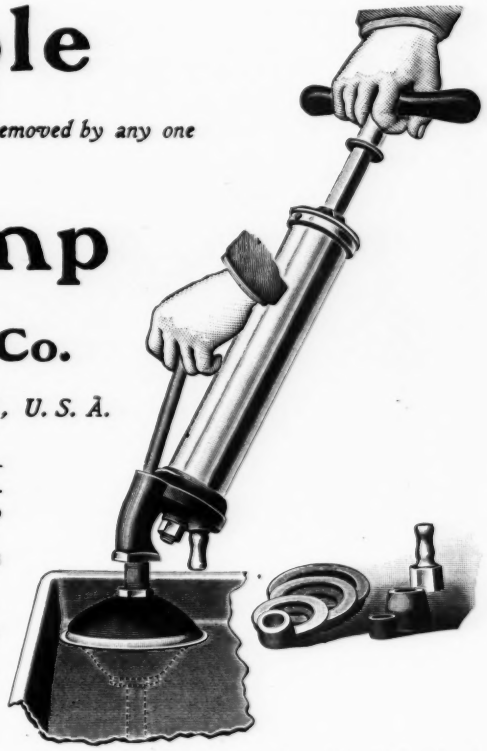
from obstructions in pipes. They can be easily removed by any one using the

Noppel Pump

Manufactured by

The Noppel Pump Co.

P. O. Box 1084 *HARTFORD, CONN., U. S. A.*

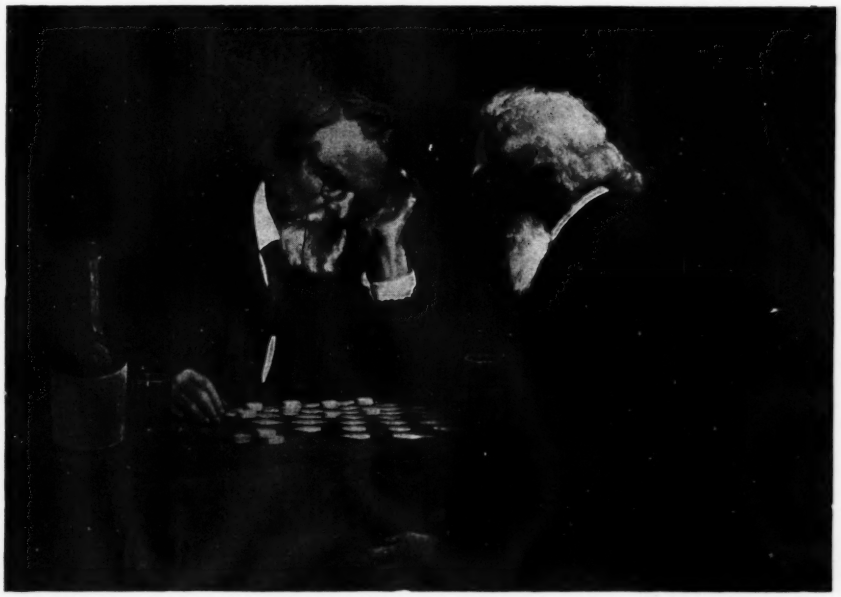


This pump is a Combination Lift, Force, Discharge and Test Pump and you can not only force air, liquid or gas into pipes, but can continue to do so, getting an ever increasing pressure. With no alteration in fittings or position of pump you can instantly change from force to suction and continue to exhaust air or draw out and discharge water and loose material. **No Other Pump has these Advantages.**

SEND FOR CIRCULAR

INDESTRUCTIBLE **SIMPLE IN CONSTRUCTION** **EASILY OPERATED**

THE AMERIGAN PROGESS ENGRAVING GOMPANY



MAKERS
OF
FINE
CATALOGUE
ILLUSTRATIONS

15 to 17 WEST SIXTH STREET, CINCINNATI, OHIO, U. S. A.

GEM Hot Water and Steam BOILERS

EASILY AND QUICKLY SET UP
CAPACITY GUARANTEED

WE ALSO MAKE THE

ABENDROTH VERTICAL SECTIONAL STEAM AND WATER BOILERS

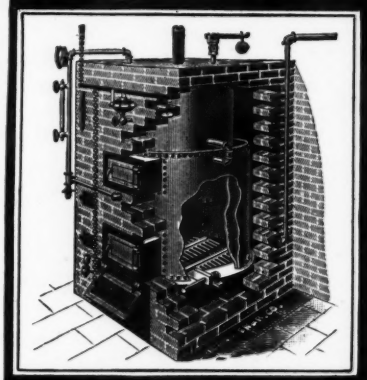
LONG AND FAVORABLY KNOWN TO THE TRADE EVERYWHERE

Write for Illustrated Catalogue

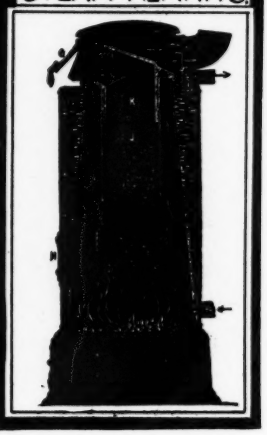
ABENDROTH BROS. 109-111 Beekman St., New York
114 High St., Boston, Mass.
Pt. Chester, W. Chester Co., N.Y

AGENTS: Crane Co., Philadelphia, Pa. Western Valve Co., Chicago, Ill.

KEWANEE BOILER COMPANY
KEWANEE ILL.



MANUFACTURERS OF HAXTUN STEEL BOILERS FOR HOT WATER AND STEAM HEATING

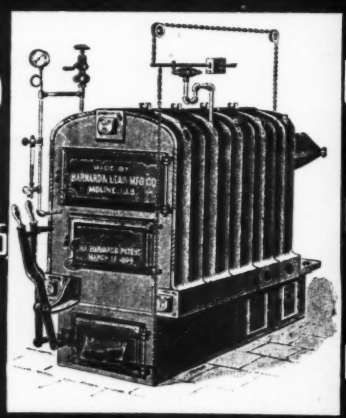


"TABASCO" WATER HEATERS
ALL STEEL SELF FEEDERS

SEND FOR SPECIAL CATALOGUES
169 LAKE ST.
·CHICAGO·

THE BARNARD BOILER FOR STEAM AND HOT WATER HEATING

ADAPTED TO ALL KINDS OF FUEL



IS ECONOMICAL DURABLE AND EFFICIENT

IS SIMPLE AND EASY TO OPERATE

SEND FOR OUR NEW CATALOGUE

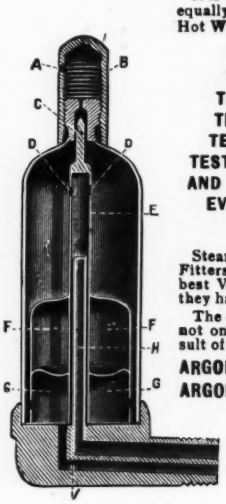
BARNARD & LEAS M'F'G CO.,
MOLINE, ILLINOIS.

STANDS ALL TESTS

IN ORDER TO OBTAIN THE BEST RESULTS IN RADIATION IT IS NECESSARY TO USE

The Argon Automatic Air Valve

It is the only one on the market equally efficient on both Steam and Hot Water Radiators.



TESTED FOR AIR
TESTED FOR GAS
TESTED FOR STEAM
TESTED FOR WATER
TESTED FOR SERVICE
TESTED FOR PERFECTION
AND NOT FOUND WANTING
EVERY ORDER BRINGS
ITS DUPLICATE

Steam Heaters, Contractors and Fitters are not acquainted with the best Valve on the market, unless they have tried the ARGON.

The decision of experts, evinced not only in opinion, but as the result of experience, is that the

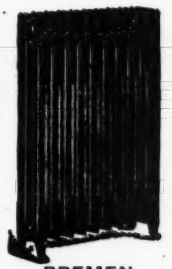
ARGON VALVES DO THE WORK
ARGON VALVES ARE RELIABLE

Need No Adjustment
Are Guaranteed

INTERIOR VIEW. EXTERIOR VIEW

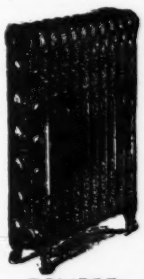
WRITE FOR SAMPLE

The Argon Manufacturing Company
DENVER, COLORADO.



BREMEN

Our goods and prices will interest you—permit us to demonstrate this.



ECLIPSE

Holland Radiator Co.

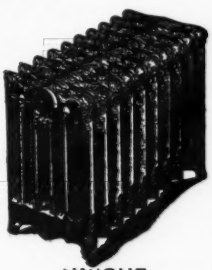
CHICAGO: 38 DEARBORN STREET
DENVER: 1759 STOUT STREET
WORKS: BREMEN, IND.

RELIANCE

Agents:

United States Water and Steam Supply Company, Kansas City

The George Worthington Company, Cleveland



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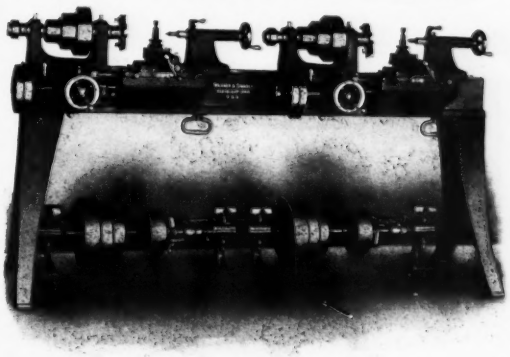
A COMPLETE LINE OF

Screw Machines and Turret Lathes
BRASS WORKING MACHINERY



DOUBLE HEAD KEY LATHE
For Turning Keys for Steam, Water and Gas Cocks.

SEND FOR GENERAL CATALOGUE

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The Atlas Pipe Wrench

THE LATEST AND BEST PIPE WRENCH

No Threads to Strip . No Nuts to Jam
Made of Special Wrench Steel and Drop Forged

The good qualities of Chain Pipe Wrench and Screw Pipe Wrench combined, without the faults of either.
Quick, Effective and Positive in Adjustment.
Cannot Slip, Crush or Lock on the Pipe.

Made in Four Sizes: 10, 18, 24 and 36 inches.

Handling from ⅛ of an inch Wire to 4½ inch Pipe. Price no higher than other Pipe Wrenches on the market.

Atlas Pipe Wrench Co.

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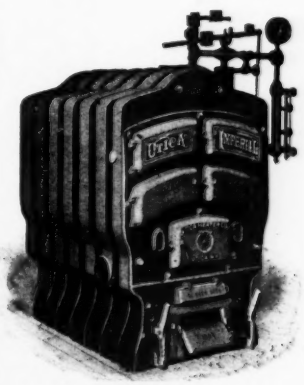
The "Imperial"



Has no Equal
Convenient to Install
Easily Operated
Economical in Fuel

New and desirable features never before employed.

Send for Circular and Terms to Agents

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FOR RESIDENCES AND PUBLIC BUILDINGS.

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CARTON AVE. UTICA N. Y.

First Mantle Burner for Acetylene Gas.

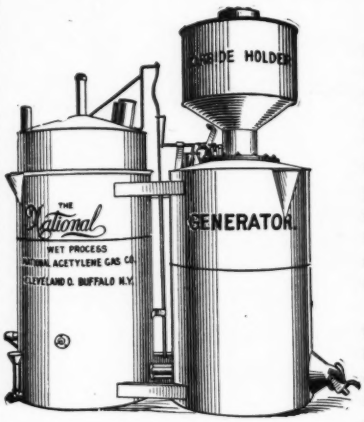
Increases candle power of acetylene gas marvelously, giving an extremely beautiful and steady light at extremely low cost. One cubic ft. of gas develops 950 candle power. Burners will not carbonize or clog. Made in four sizes, consuming ⅛, ¼, ½ or 1 foot of gas per hour.

Price for single Burner $3.00. Price for single Mantle $0.35.
Special trade Discounts on application.

Atlantic Acetylene Burner Co.

179 SUMMER STREET, BOSTON, MASS.

The New National



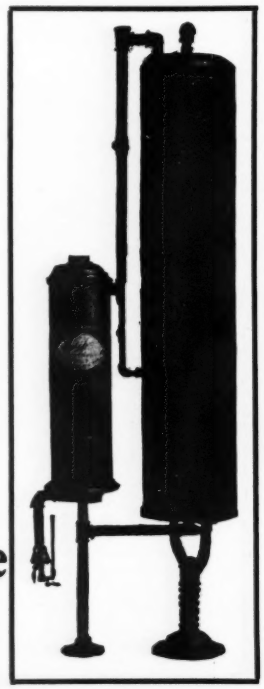
The only machine on the market which can be loaded with enough carbide to run 30 days or more without recharging. The only machine which does not produce after-generation when lights are turned off. The only machine which does not allow the gas to escape while recharging.

The carbide is fed into the water in a granulated form, thereby insuring cool, pure gas at all times. By our process of purification we are enabled to use Acetylene gas for cooking and running gas engines. The new National is fully approved by all the Boards of Fire Underwriters throughout the United States. **Local and General Agents Wanted**

Boston National Acetylene Gas Co.

17 State Street, Boston, Mass.

Eclipse ROUND WATER HEATERS



80 per cent
of the heat units in every foot of gas utilized with this heater.

Capacity:
a gallon per minute to a temperature suitable for bath, with smaller size heater. Made in three sizes.

Cost
less to connect.
less to operate.
less than other heaters.

Eclipse Gas Stove Company

ROCKFORD - ILLINOIS

COLT TRADE MARK. CARBIDE FEED ACETYLENE GAS GENERATORS

Indorsed by the United States Government. The Department of Agriculture of the State of Pennsylvania says: "Safer than the usual employment of petroleum."
Entirely new principles involved. Made of the best materials, by the most expert mechanics. Guaranteed by the largest and most experienced concern in the business.

The COLT TRADE MARK Generators, are lower in price, more economical, and more easily installed and operated than any other make, and occupy one-quarter of the space.
No waste of gas; no heating. This is not true of other makes.

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The Number Twelve ACME

IS OUR LATEST

It is built on the Principle of the Old Reliable

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The "FATHER" of Instantaneous Water Heaters wherein the Products of Combustion of the Gas and the Water do NOT come in Contact.

List Price

$25

It is designed on new and artistic lines and contains a very large Heating Surface; it is fitted with our new BURNER,

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and WATER PRESSURE REGULATOR.

Features that will be appreciated by the trade. New catalogue on application to the makers of

The Largest and Most Perfect Line of Instantaneous Water Heaters on Earth.

The Instantaneous Water Heating Company

Ohio and Orleans Streets

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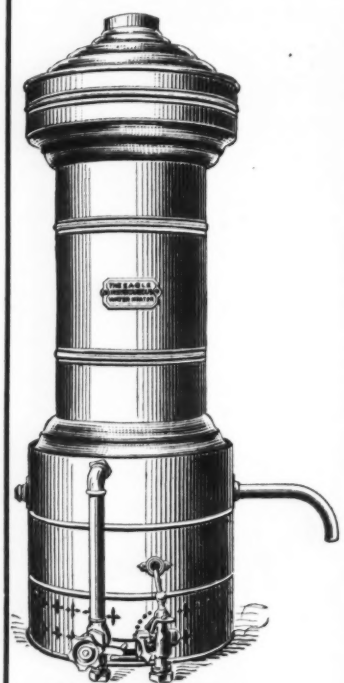


THE EAGLE NO. 3.

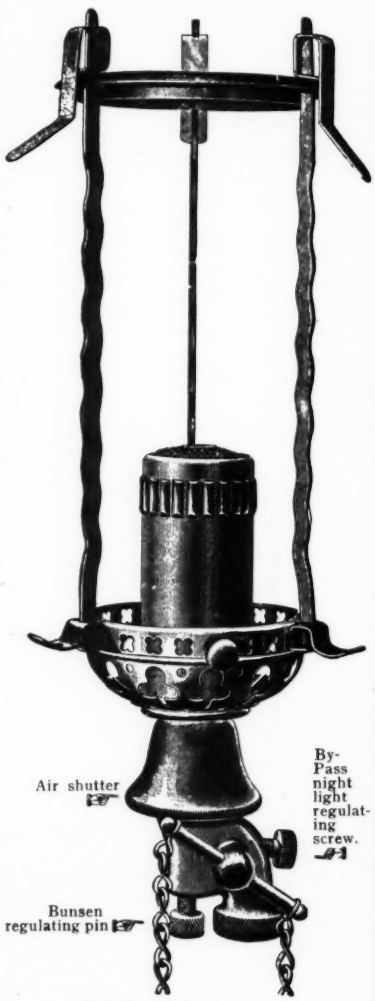
THE EAGLE NO. 5.

INSTANTANEOUS WATER HEATERS INCANDESCENT GAS BURNERS

Will prove themselves the favorites for 1901.

The Interlocking Valves with Safety Pilot Light, as fitted to all Eagle Heaters, insures safety in using. The only make Heater in the world wherein all parts are interchangeable.

A By-pass Burner for Incandescent Gas Lighting that readily adapts itself to the varying conditions. It is the kind that where one is tried others follow. Good light, non-clogging, easily adjusted, and the new feature of a night light, these are the virtues that are winging the Eagle to the top.



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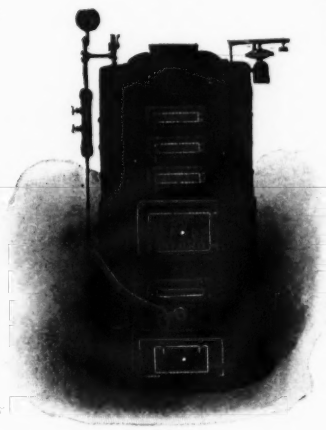
MANUFACTURED BY

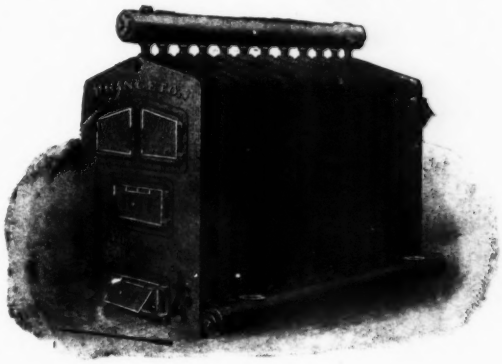
The S. Bernstein Co.

82-86 WEST BROADWAY, NEW YORK



Did It Ever Occur to You?

That a bank account was concealed in the ashpit of your heating apparatus?
A big lump of coal or a small one, which?
Economy of fuel consumption is our strong point.



That Tells the Whole Story

For Hot Water

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Amherst
Yale
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For Steam

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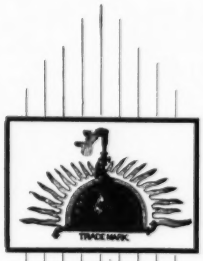

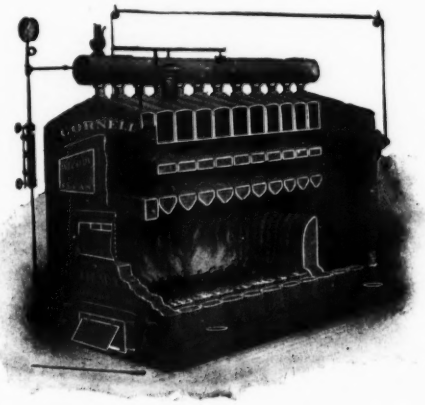

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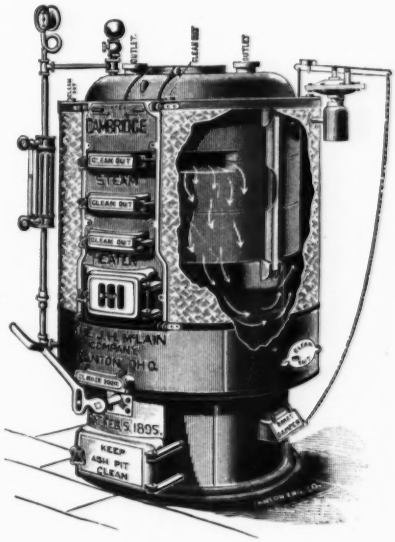
Catalogue "B" for the asking..



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WORKS AND MAIN OFFICE
CANTON, OHIO

BRANCHES

NEW YORK PHILADELPHIA CHICAGO

After all the merit of
A boiler lies in its ability
To get out of the fuel all
There is in it, and to conduct the
Heat to the radiators and
Not to the smoke pipe.
Hear what the well-known
Mechanical engineer,
Mr. W. J. Baldwin, says:

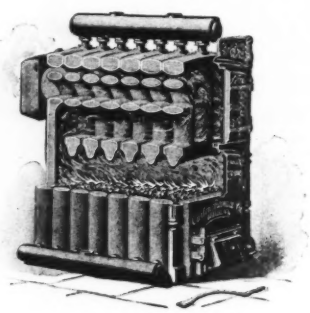
Carton Boilers

"The Evaporation per pound of Combustible was 10.07 pounds of Water."

"The Steam was at Maximun Density—Dry."

"The Low temperature at which the Gases of Combustion entered the Chimney shows that the Boiler utilizes about all the available Heat of the Fuel."

"An exceedingly high efficiency and rarely obtained in practice."



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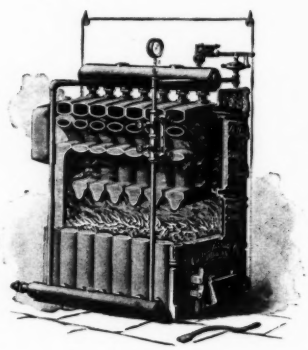
COMPARISON



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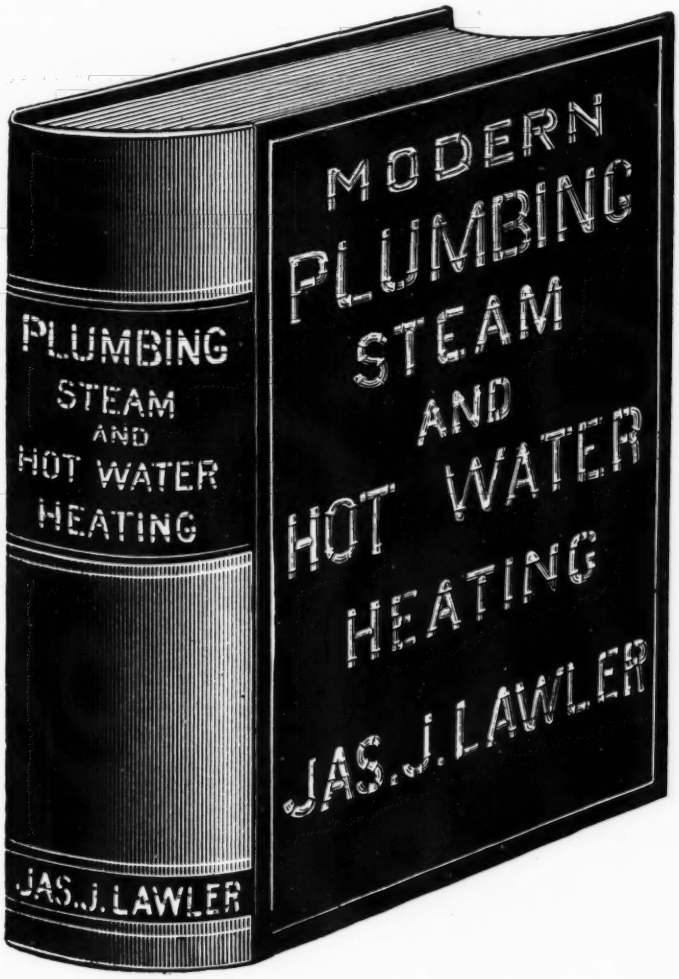
LARGEST MAKERS OF HEATERS IN THE WORLD

LATEST AND BEST



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It explains soil and waste pipe ventilation, back venting, the house trap, the fresh air inlet and their advantages. Siphonage of traps, the cause and how to remedy the same. How to test soil and waste pipes. Probable questions of plumbing examining boards, and answers to same. Hydraulics of plumbing, with original illustrations. Practical drawings and all important features in the construction of modern plumbing work.

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It tells how to correctly figure on any size or shape of building with steam or hot water. How to find the heating capacity of any shape or make of boiler for steam or hot water heating. The most practical timesaving tables ever compiled and published. A new table of how to quickly find the correct measurement of 45° angles, a most useful thing in steam and hot water construction. This has never before appeared in print.

More practical illustrations than ever published in any one volume, which shows the various systems of construction, in the heating and ventilating of buildings by the steam or hot water systems.

Over three hundred diagrams and illustrations, showing the various systems of construction in the heating and ventilating by steam or hot water systems. Six folding inserts showing waste pipe system of plumbing, one pipe system of both steam and hot water heating, overhead system, fan system of heating and ventilation, and steam and hot water circuits. 400 pages, large octavo size, 10x7½ inches. Bound in extra cloth.

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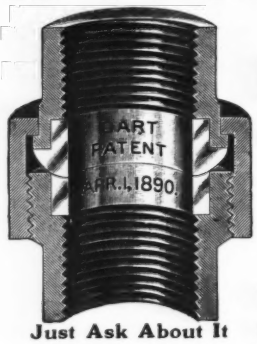

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Bronze Ball Seats
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Manufactured by

E. M. DART MFG. CO.

Providence, Rhode Island

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THE OLD RELIABLE

A NEW TYPE FOR SMALL HOUSES.

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	STEAM	HOT WATER
No. 15	175 ft.	275 ft.
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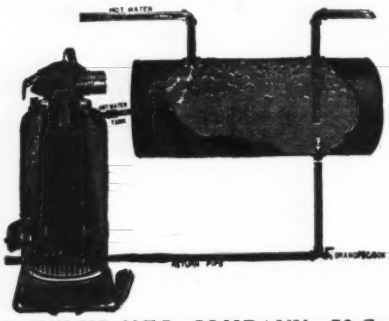

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All Steel.

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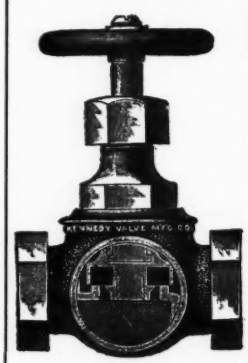

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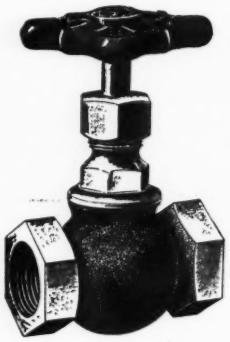

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Sold from Standard Lists.

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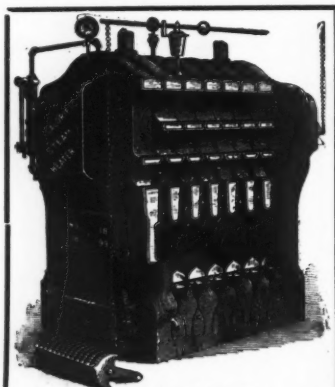

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Always Good and Cheaper than others...

Also make Calorific Gem and Calorific Junior.....

Agents treated fairly and wanted..... .....

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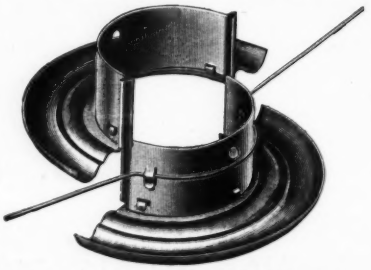

The only split plate that always stays in position; not affected by expansion of steam pipes; handsome and strongly made.

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VAPOR SYSTEM

Adapted to the heating of buildings of any kind and size. Has all the advantages of Hot Water without its objectionable features.

Absolutely Noiseless. No Pressure. No Air Valves. No Pumps nor Machinery. Heat under Perfect Control. Send for Catalog.

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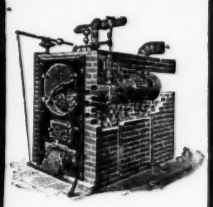

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FOR

Steam and Hot Water Heating

FOR SOFT OR HARD COAL

Durable and Economical. We claim to save 33 per cent in fuel, as compared with other boilers.

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THE FURMAN NEW SECTIONAL

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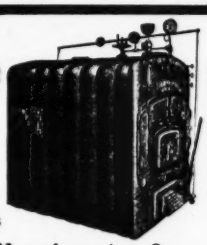

21 SIZES
from 350 to 4,000 sq. ft. radiating surface.

SLIP NIPPLE CONNECTION
NO PACKED JOINTS

ANY SIZE
READILY ENLARGED

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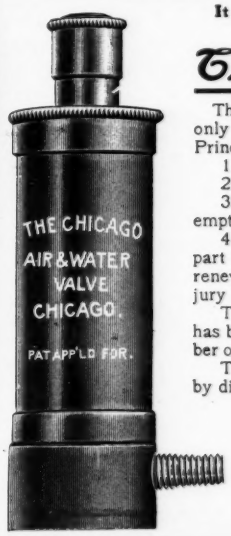
It is not only the name but the valve!



The "CHICAGO"

This Steam Radiator Air and Water Valve is the only valve that has the four correct Mechanical Principles of Perfection.

1. It will free radiators and coils from all air.
2. It absolutely prevents all water leakages.
3. The air chamber and separate partition empties valve from water and it will not water-log.
4. Durability of valve is assured, as expansion part is protected from injury and can be readily renewed at slight cost, while with other valves injury to expansion part destroys valve.

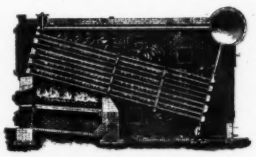
This valve is entirely automatic in action and has been severely tested, having been in use a number of years and giving perfect satisfaction.

The several features of this valve are protected by distinct patents. Other patents pending.

None Genuine Unless the Name "CHICAGO" is Stamped thereon.

Chicago Air & Water Valve Co.
31-33 South Canal Street
Chicago, Ill.

If it was not so



we could not afford to say it was so. A badly constructed and working boiler kills future business. A good boiler like ours, makes new customers every time you use one. Their principle points are fuel saving and great lasting quality. Other good points are mentioned in our free catalogue.

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STRONG TAGS For SUBSTANTIAL BUSINESS.

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MANUFACTURERS OF
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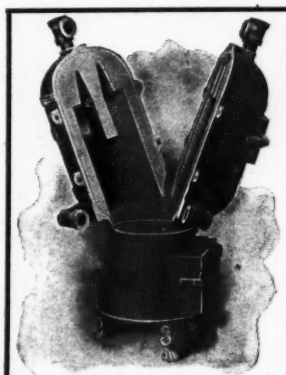
STRONGEST SHIPPING TAGS IN MARKET



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See how we do it

By asking for our "D E" catalog, you can see how to make money for yourself and friends of your customers, by handling our heating boilers, radiators & steam specialties.

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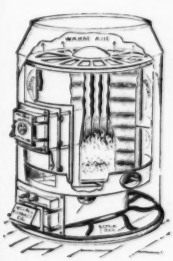

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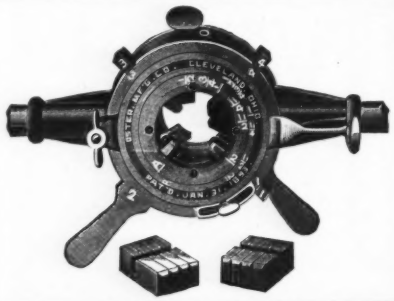

Steel pipe is easily and accurately threaded with our modern tools

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For tapping water and gas mains against pressure. It leads them all. Sold on approval. Taps mains from 3 to 30 inches. No saddles required for different sized mains. Weight, complete, only 18 lbs. A boy 12 years old can make a connection in 15 minutes. Get prices from

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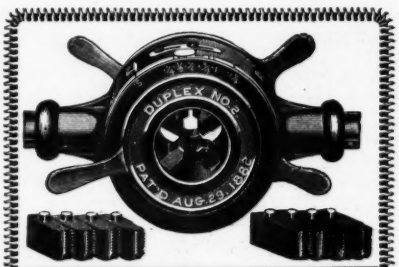
Domestic Engineering
The Leading Journal of its Class



HART'S

DUPLEX ADJUSTABLE STOCKS and DIES should be in the hands of every PLUMBER AND PIPE FITTER. DO YOU OWN ONE? Let us mail you list and quote prices : : : : :

THE HART MFG. CO.
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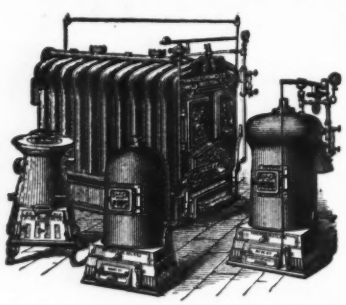

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GOLD MEDAL HIGHEST AWARD
PARIS EXPOSITION

THE MOST COMPLETE LINE UNDER ONE NAME MADE IN THE UNITED STATES

OUR CAPACITIES RANGE IN
Square feet of Water Radiation 100 to 6,000
Square feet of Steam Radiation 200 to 3,600

Send for catalogue Correspondence solicited

MAGEE FURNACE CO., BOSTON, MASS.

WORDS OF WISDOM

"Do not advertise and stop,
But advertise and stay,
For those who read your ad last week,
Will look for it to-day."

DIXON'S GRAPHITE COMPOUND

Is infinitely better than red or white lead for making steam, gas or water pipe joints. Joints will be tighter, and can be broken months or years after without damage to pipes or tools. IT WILL PAY EVERY PIPEFITTER TO SEND FOR SAMPLE AND CIRCULAR.

JOSEPH DIXON CRUCIBLE CO., JERSEY CITY, N. J.

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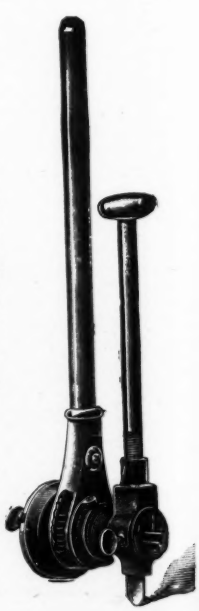

is an indispensable tool for conveniently threading iron pipe in ditches, under floors, in corners, overhead, etc. With this tool threads can be cut without removing whole lengths of pipe. This tool is provided with a strong vise which securely grips the pipe, and by means of the leading thread the die is forced on pipe and the thread is cut. It is made of malleable iron and steel, and, while light in weight, making it convenient to carry, is very strong and rigid. The advantages of this tool make it absolutely indispensable to Plumbers, Steam and Gas Pipe Fitters, Gas and Water Companies, Machinists, etc. It takes standard size dies, which are extra if furnished.

No. 1 threads ⅛ to 1 inch pipe, takes die 2 and 2½ inches square.....$10.00
No. 2 threads 1 to 2 inch pipe, takes die 2½, 3 and 4 inches square $17.00

For sale by leading jobbers.

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C. M. KEMP MFG. CO.
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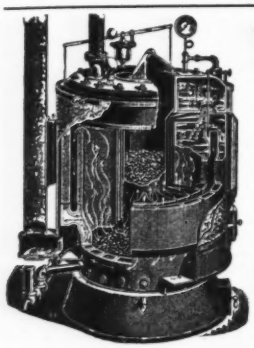

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How coal is wasted up a flue. We guarantee the "ROBERTS" to be the most economical and easily managed boiler on the market. Will not such a boiler get you further orders?

Philadelphia Office:
Builders' Exchange,
18 South 7th Street

Roberts Machine Company
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State size and amount of

WROUGHT PIPE

wanted and we will quote extremely low prices. We carry over 1200 tons in stock. **F. K. BOWES & CO.**, 1605 Great Northern Bldg. Chicago

Up-to-date Manufacturers

do not need to be told that feeding boilers with cold water is as obsolete as flint-lock guns, and the manufacturer "not up-to-date" will not "keep" long in our American climate. Which is the best **Feed Water Heater?** is a question that perplexes many who have not investigated **THE WEBSTER FEED WATER HEATER AND PURIFIER.** Would you like to investigate it? and shall we help you do so?

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CHICAGO, 1509 Monadnock Bldg.
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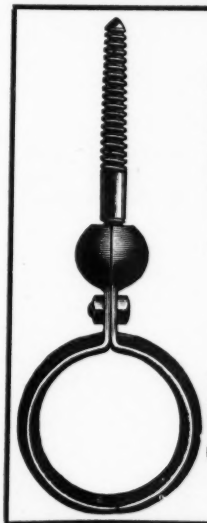

Hanna Ball Joint Pipe Hanger

Simplest...Strongest

Made of Malleable Iron. All ways the best. Carried in stock and for sale by all :::::: Supply Houses

The Penn Engineering Company
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GET RID OF YOUR TANK TROUBLES BY GETTING AN UNLEAKABLE

CYPRESS TANK

We make every size and shape. Write for particulars, prices, etc.

G. M. DAVIS & SON
PALATKA, FLORIDA

Don't be a Hidebound Hawkins

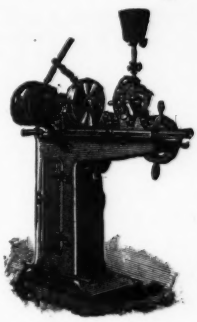
There is some where in the United States (we don't like to say just where) a manufacturer of brass articles who was investigating our **Forming Lathes**; we looked over his work and told him the number of pieces per day our lathe would make, and then he wouldn't buy a lathe because he said **HE COULDN'T SELL MORE THAN HALF AS MANY GOODS AS THE LATHE WOULD MAKE.** We have nicknamed this man "Hidebound Hawkins." ::: ::: ::: ::: :::

The Meriden Machine Tool Company
106 Britannia Street, Meriden, Conn., U. S. A.

JARECKI MANUFACTURING CO., = Erie, Penn.

Erie Pipe Hangers

Erie Malleable Unions Copper P'ck'g
Always ready for instant use.



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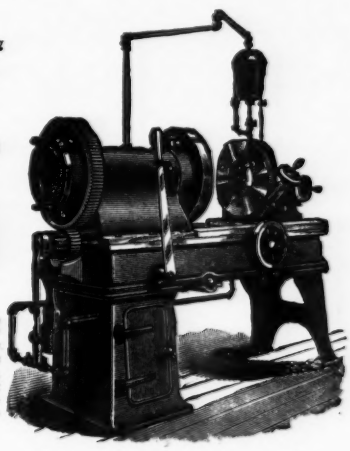
Drainage Fittings

Pipe Threading and Cutting Tools Write for catalogues showing the most complete line of ⅛-inch to 16 inches for Hand, Belt, Engine, and with Electric Motor Attachment. We can furnish Bolt-Threading Attachments for these machines.



BARNES 3-Wheel Pipe Cutters

Made in 8 sizes, cutting pipe from ⅛ to 12 in. diam.

The "Genuine" bear this registered trade mark.

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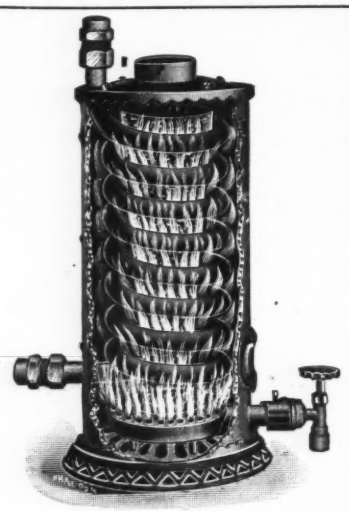
Manufactured by **Barnes Tool Co.** NEW HAVEN, CONN.

WE OFFER YOU:—

Enameled Flat and Roll Rim Kitchen Sinks.
Enameled Corner and Flat Back Lavatories.
Lavatory Traps, Brackets and Supply Pipes.
Bath Supplies, Solder, Nipples and a large variety of Plumbing Brass Goods.

GET OUR PRICES BEFORE PLACING YOUR ORDER.

THE HUMPHRYES MFG. CO.
MANSFIELD, OHIO
New York Office: 81-83 Fulton Street.



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GAS - - WATER
HEATER

PRICES WILL SURPRISE YOU

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222 Eighth Avenue, Homestead, Pa.

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Planet Mills Mfg. Co.

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"TOTAL ECLIPSE"

Hydrants and Street Washers

The cheapest and most durable on the market.

Guaranteed to give entire satisfaction

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Carried in stock by all Jobbers

WRITE YOUR DEALER FOR PRICES

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McVAY & WALKER
Manufacturers of Enameled Tubs.

WILL GLADLY SEND PRICES ON THE TWO BEST TUBS MADE.

Write Today. **Unique and Eureka** Prices will surprise you.

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GET THE LATEST

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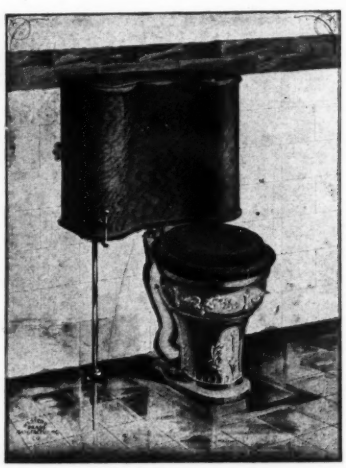

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Manufactured by

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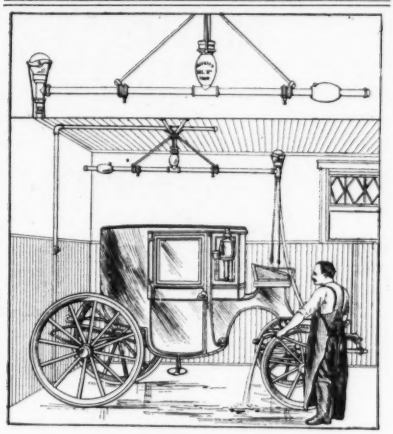

for Buggy Washing, Boiler Blowing, by water or steam, conveying liquids to different receptacles; useful in stables, factories, foundries, round houses, breweries, pickle factories, etc. A clever plumber will find hundreds of places for it. Agents wanted—Territory free.

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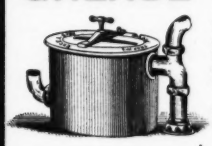

Well and favorably known; two sizes for hotels and restaurants and residences. Get list price and trade discounts.

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Sisson Insertable Joint
Indispensable to Plumbers
A friend in need is a friend indeed.
THE S. I. J.
FOR SOIL PIPE
Sizes 2 to 6 inches. Light and Heavy.
Makes a neat job and saves your patience.
ASK YOUR JOBBERS FOR IT

This does the trick.
MANUFACTURED BY
R. ESTABROOK'S SONS
SOUTH BOSTON, MASS.

IF YOU ARE INTERESTED IN SECURING

Reliable Plumbing, Steam, Gas and Water Supplies

Prompt Shipment and Correct Prices

CALL UP PHONE MAIN 1882 MAIN 1817
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Sanitary Specialty Mfg. Co.
24 to 30 Milwaukee Ave.
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H. Verbeek, Pres. and Mgr.
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ROCHESTER LAMP was made there have been many "like" or "as good as" it placed upon the market. Some were even said to be "improvements" on it. One by one they fall by the wayside, for experience proves that there is only one lamp that is really better, and we make that, too,

THE NEW ROCHESTER

In it we embody all that is really worth having in a lamp, both as to quality and style. Don't forget, *every genuine New Rochester has the name on the lamp.*

We can fill every lamp want. No matter whether you want a new lamp or stove, an old one repaired or refinished, a vase mounted or other make of lamp transformed into a NEW ROCHESTER, we can do it. Let us send you literature on the subject.

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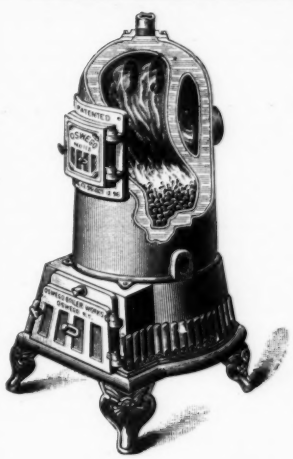
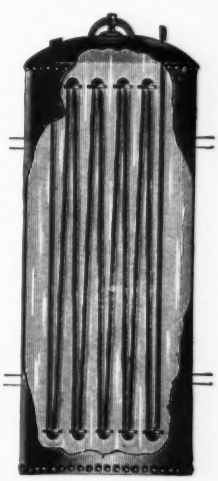


HOUSE HEATERS
TANK HEATERS

Sectional Boilers

Expansion Tanks



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The Victor Instantaneous Water Heater

is the cheapest, the most efficient and the neatest water heater made. It occupies but little space and is always ready, furnishing hot water in a few seconds, day or night.

The Victor received the highest award at the Omaha Exposition in 1898.
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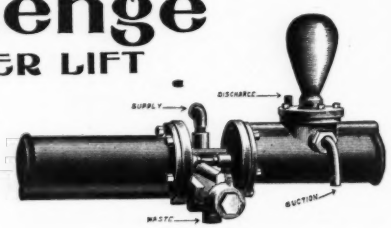
AUTOMATIC WATER LIFT

FOR TANK OR DIRECT PRESSURE.



Balanced valve. Always works.
Cannot stick. Fully guaranteed.
M hydrants, plumbers' brass work.
Write for prices and catalogue.

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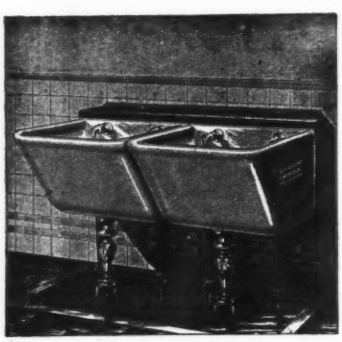
LA FAYETTE, IND.



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Good buyers want to know what that means. They may learn by asking for a catalogue of our imperishable Sanitary Laundry Trays and Sinks.

Chas. Graham Chemical Pottery Works

986-1018 Metropolitan Avenue,
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DON'T BLAME THE PAPER

"I know the readers are there and that they have money to spend. When I fail to get results I know there is something wrong at my end of the line." :: :: :: :: :: :: :: ::

Every Job of Plumbing Needs

The Sieben Floor Drains

Save digging a deep ditch. Calking of joints. Extra fittings. Hours time and grief. No stoppage of sewers. No evaporated trap seal. No back water and need no vent pipe. Made with or without back water valve. Ask your jobber or write for catalogue.

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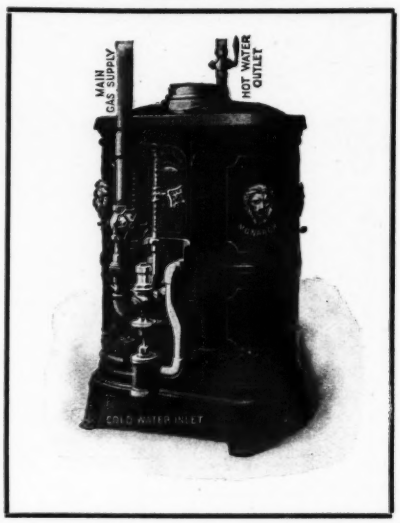
"MONARCH" LEADS



The "MONARCH" Automatic Instantaneous Water Heater, is the first and the best; in fact 'tis the "survival of the fittest".
Send for Catalog fully illustrated and you will be convinced.

MONARCH WATER HEATER CO.,
306 Wood St. Pittsburg
Robert B. Caverly, 504-506 Tenth St., Washington, D. C.

Very Useful!

DOMESTIC ENGINEERING'S JOBBERS' LIST.
Price, $5.00.

Good Things for Plumbers

Bracket Rings
for Range Boilers, No cumbering legs or stands.

Elevator Water Register
Prevents overcharge for water used on elevators.

Soil Pipe Testing Valve
Makes quick and perfect test.

Fresh Air Inlet Guard
This guard will not stop up like most others.

Balsago Soil Pipe Cement
Makes tight joint without breaking hubs.

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Worcester, Mass.

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Has a field of its own
THAT IS WHY

Advertisers get results

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BOSS WASHER

TAKE NOTICE
No Boss Washers are Genuine that do not have the inventor's name "ANDREW BELL" on Label of box.

Samples sent by Mail

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ANDREW BELL
376 MARKET ST., NEWARK, N. J.

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Where You Need It.

The No. 22 Candle burns gasoline or kerosene and makes a strong light. Just the thing needed to help you catch that thread, get a measure, or see just what the trouble may be.

Price 75 cts. polished brass.
" 85 " nickeled.

Will be mailed for 15 cts. extra.

Jobbers sell at factory price.

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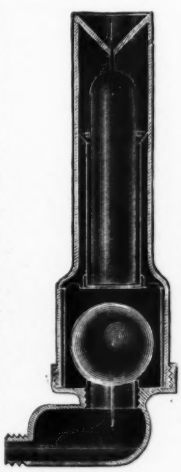
TWENTIETH CENTURY AIR AND VACUUM VALVE



Is a positive seal against the return of air to the radiator through itself, and enchances the value of a low pressure steam heating plant fuly 50 per cent, while it materially reduces the coal bill.

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40 DEARBORN STREET
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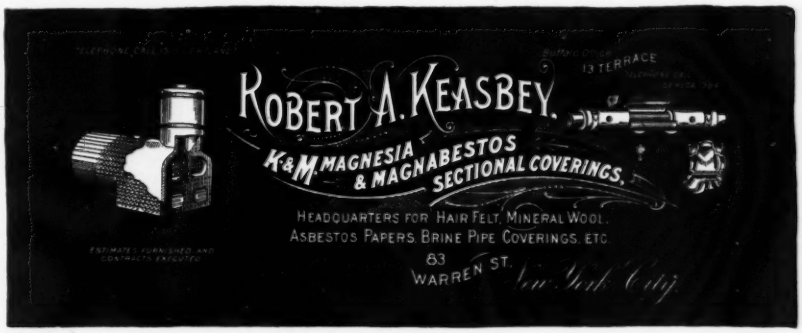
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HEADQUARTERS FOR HAIR FELT, MINERAL WOOL, ASBESTOS PAPERS, BRINE PIPE COVERINGS, ETC.
63 WARREN ST. New York City
13 TERRACE

SMOOTH-ON COMPOUND IRON CEMENT No. 4

TRADE MARK

will repair leaky boilers, piping, etc., it will withstand fire, water, steam and oil, it expands and contracts the same as iron. Write for catalogues and prices.

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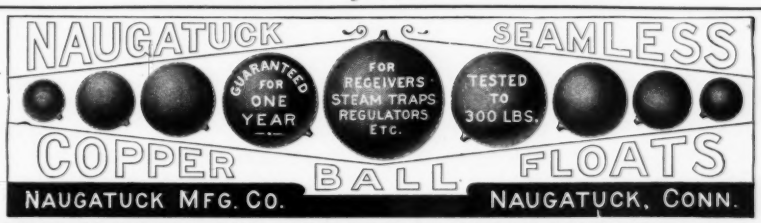
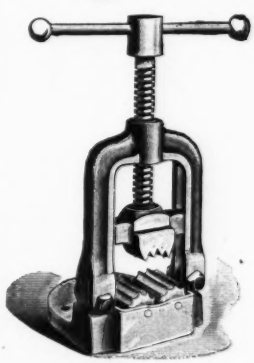
For Sale by Henion & Hubbell, 61-69 N. Jefferson St., Chicago, Illinois.



Keystone Malleable Pipe Vise

(PATENTED)

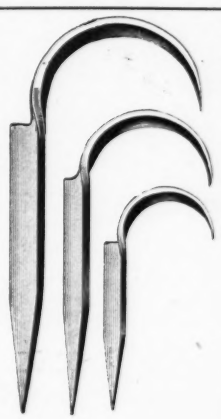


No. R, holding Pipe ⅛ to 2 inches.
No. S, " " 1 " 4 "
No. T, " " 2 " 6 "
No. U, " " 6 " 12 "

LIBERAL DISCOUNTS TO THE TRADE.

Equipped with Roller Jaws which are a sure grip, will not mar the pipe and will outlast three or four sets of V Jaws.
This Vise is a Cracker Jack for the Money. Manufacturers of Pipe Vises (ourselves included) have been slow in not getting on to fluted rollers for pipe jaws years ago.

Hollands Manufacturing Company, Erie, Pa.



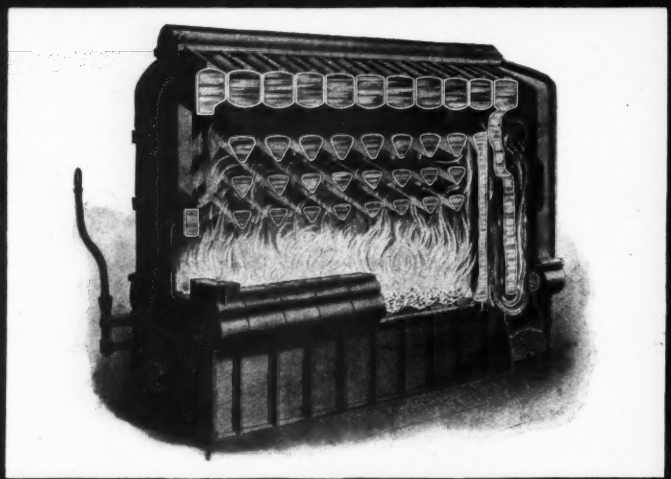
Malleable and Wrought Pipe Hooks and Straps

Complete stock of every size and kind. Quality the best that can be made. B.B. Ornamental Pipe Straps, all even, clean cut, brightly tinned. Ask for catalogue and prices.

BERGER BROS. CO. 231-237 Arch Street PHILADELPHIA, PA

"BURNHAM" BOILERS

FOR STEAM AND WATER HEATING.



RELIABLE,
DURABLE,
ECONOMICAL,

QUICKLY SET,
TIGHT JOINTS,
EASILY MANAGED.

LORD & BURNHAM CO.,

GENERAL OFFICE AND WORKS,
IRVINGTON-ON-HUDSON, N. Y.

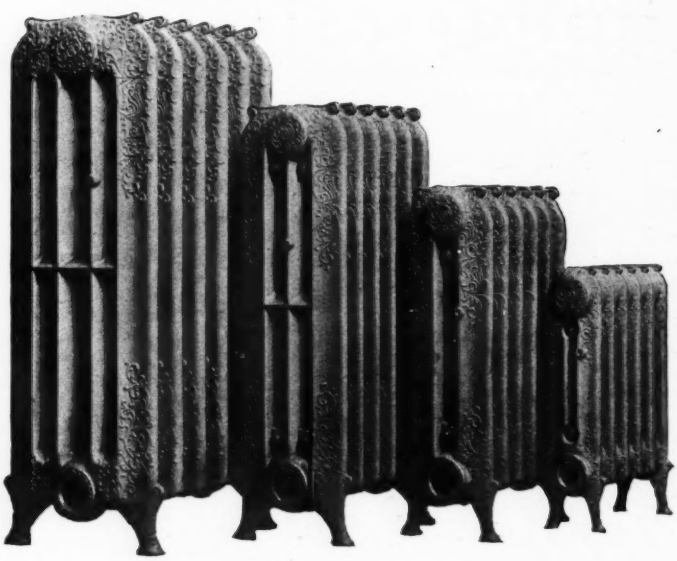
NEW YORK OFFICE,
1133 BROADWAY.

TRITON RADIATORS

We have told you a number of times about our 1, 2, 3 and 4 column

Triton Radiators

and this is the first view we have ever had of the different widths together. Our new catalogue just out tells all about all of our radiators. Ask for one.



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13-21 Park Row

Dunkirk, N. Y.

New England Agency:
The Richmond Stove Co.
Norwich, Conn.

DOMESTIC ENGINEERING

Plumbing : Heating : Lighting :: Ventilating

Whole No. 141 *JULY FIFTEENTH, NINETEEN HUNDRED AND ONE* *Vol. 21, No. 4*

Plumbing and Household Sanitation—XII.

A Course of Lectures which, when completed, will cover the theory and practice of the art

By J. Pickering Putnam, of Boston, Mass.

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Copies of issues of Domestic Engineering containing the ten previous installments may be had at 20 cents each.

By Passes.

One of the evil effects of the complication of piping due to the trap vent law is that it renders the plumbing more difficult to arrange, repair, and understand. The proper placing of the vent-pipes often requires considerably more skill on the part of the workmen than is expected of or found in them. The result is a very frequent misplacement of the pipes, which sometimes remains undiscovered by the plumber, and even by the owner, until made known by foul odors or more serious evils.

Figs. 90, 91, 92, 93 and 94 illustrate the manner in which this complication leads to trouble. The vents in these cases were all put acording to the letter of the plumbing law, and seem at first sight to be correctly placed, but upon closer examination it will be discovered that they are not only themselves utterly valueless as ventilators, but that they destroy the value of all the traps. They form by their peculiar combinations open passageways for the entrance of sewer-air from the soil-pipe into the house. The errors appear to have been brought, after the completion of the work, to the attention of the board of health.

These first five drawings are from the "Sanitary Engineer." The arrows show the manner in which the sewer-air may find its entrance by circuitous route into the dwelling. In Fig. 90 three fixtures are trapped and vented. The waste-pipe of the wash-basin enters that of the bath-tub inside of the bath-tub trap. Had it entered beyond the trap, the difficulty would have been avoided. But inasmuch as it is not unusual, where no vent-pipes are used, to enter short branches on the house side of the trap, the error is not an unnatural one for the plumber to make. It is one which is not easily detected at a glance, and which might never be observed by the house-owner or anyone who was not an expert. The warmth of the air in the house and the draught of the fire-places would often be sufficient to create a reverse current in the vent-pipe, and produce the movement shown by the arrows. It will be observed that the bath-tub trap is vented on both sides. The effect of this is to increase the destructive action of the ventilating current on the water seal of the trap. An S-trap, having the usual depth of seal of 1½ in. or 1¾ in. would lose this seal in a few hours if the current were rapid, or within two or three days with an ordinary current. The water closet trap being, as shown, larger than the others, a current might easily be formed over the bath trap simultaneously on both sides of the trap.

Figs. 92, 93, 94 give similar examples. In all cases the mistake lays in entering the waste of one fixture on the wrong side of the trap of another. In each illustration one of the traps will be found to have a double action exercising against its water seal.

Fig. 95 shows an arrangement of fixtures taken from a house described by Dr. Teale, in which each discharge of the water closet siphoned the wash basin trap with the greatest ease. The gentleman occupying the bedroom from

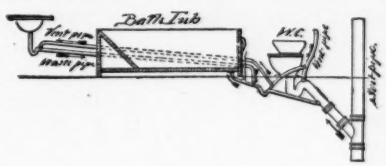


Fig. 90.

which this illustration was taken was suffering from erysipelas of the face, and was about to undergo a surgical operation. His surgeon refused to perform any operation until the lavatory pipe was cut off from the drain and made to discharge into the open air. In the climate of England this treatment is a safe one so far as freezing is concerned, but is not permissable here. As here arranged, we have excellent conditions for producing self-siphonage of the wash-basin trap. When a basin having an outlet as large as the one shown is discharged by lifting the plug it will fill its waste pipe "full-bore," and the contents of the basin up to its overflow opening will fill the pipe full as far as to the horizontal rims of the pipe. This long arm of the siphon will at once pull over the water in the short arm as soon as the basin is empty, and the suction on the trap will continue until the water column has traversed the entire length of the branch waste, thus giving the siphoning action ample time to suck out any water that may trickle down into the trap from the basin after the discharge. This action will be the more positive the longer the branch waste and the greater its pitch, reaching its maximum with the perpendicular position of the waste pipe.

Fig. 96 exhibits still more forcibly the absurd confusion this system leads us to when we attempt to carry it out com-

pletely in its logical consequences. We have here the vent and waste pipes for three simple fixtures, which are taken with some modification from a house in New York, where they have been exhibited with pride by their perpetrators. These fixtures and arrangements are repeated on each of

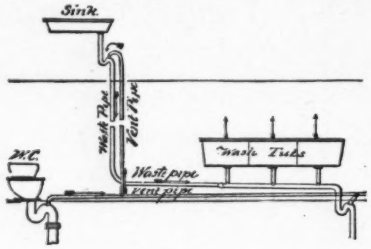


Fig. 91

several stories. We have shown only the waste and vent pipes. When to these, we imagine, are added the necessary hot and cold water supply and service pipes, we can form a pleasant idea of the condition of things our "branch-waste" ventilating engineers are bringing us to. The fixtures have the double vent, recommended by some of our sanitary engineers and plumbers. The upper vent enters a flue or pipe heated by an interior steam pipe, as shown, and is called the overflow and local vent pipe. None of the shallow traps used could withstand the action of these strong air-currents more than a few days or even hours. In consequence of this, house-owners often close up the overflow openings of wash-basins and bath-tubs with putty or corks in the hopes of rendering themselves secure against the odors resulting from evaporated trap seals. And this closure of the air supply to traps through overflow passages greatly increases the danger of trap siphonage, as we shall hereafter show.

Observe the complication of the plumbing involved by the use of these wriggling, intertwining vent-pipes, which, like venomous snakes, literally crawl about, ready to poison

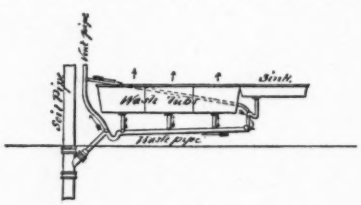


Fig. 92.

as well as puzzle and alarm the unhappy house-owner or plumber who unskilfully handles them, with the noxious vapors which they are designed to carry off in their bodies. In the economy of nature the serpent is found to have certain useful purposes, but the trap-vent has none, and should suffer the serpents' curse and be crushed out of existence as soon as possible.

One of Boston's leading plumbers said to me one day: "We know perfectly well that the 'back-vent' law is an imposition upon the public, but the law was brought about by the influence of the early sanitary engineers and the sanitary engineers must, therefore, be the ones to get it taken off again." But the plumbers are doing better than this remark implied, for many of them are co-operating with the sanitary engineers in their efforts to have their burden removed.

The public are becoming so much alarmed at this increasing complication that they are reducing the conveniences of plumbing in their buildings to the smallest amount possible, where its comforts might otherwise be enjoyed in perfect safety. It is throwing an undeserved distrust upon the whole system of water-carriage.

Past Experiments on Siphonage made by Hellyer, Waring, Philbric, Bowditch, and others.

The experiments on the effects of siphonage made and published in this country and in Europe before those I have already described, were made chiefly with pan and hopper closets, and in such a manner as to produce a much feebler siphoning action than is obtained by the use of valve or plunger closets. A pan-closet produces a very slight siphoning action and this closet is comparatively seldom used to-day, although it is by no means extinct. Valve and plunger

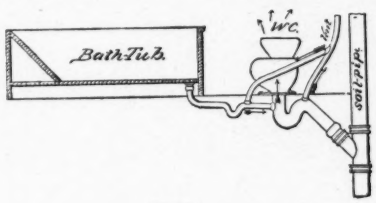


Fig. 93.

closets are fast giving way to the improved forms of hopper closets, but there are, nevertheless, thousands still in use in all parts of the country.

Even when the bowl of a pan-closet is filled to the brim and emptied as in the experiments of Col. Waring for the National Board of Health, by means of a plug, the obstructions to the downfall of the water offered by the sides of the receiver and the inertia of the water standing in the trap, prevent a disturbance at all comparable with that caused by the discharge of valve and plunger closets. The value of a closet as a flushing-tank for the drain pipes is almost exactly proportional to its siphoning power. The investigations of Col. Waring are valuable particularly in showing the siphoning power on branch wastes of the discharge of bath-tubs into the main soil pipes, an arrangement extremely common, and in establishing the utmost limit of the siphoning power of the pan-closet the one then most widely known and used. With the basin filled to the brim and suddenly discharged, the siphonage produced immediately broke the seal of unvented S traps but could not unseal a vented S.

In the experiments of Bowditch and Philbrick a short hopper closet, the next in general use at that time, was employed, and, to secure as useful results as possible the closet was charged with water from a two-gallon pail, in the manner usually done when it is used as a slop-hopper. Such a use of the short hopper forms a far severer test than its ordinary flushing, though not severer than is common when it is used as a slop hopper, and it was therefore rightly chosen for these experiments. Nevertheless, the action is evidently less trying on traps than the sudden discharge of some forms of valve and plunger closets. Even if the same volume of water is used it is clear that water poured into a hopper from a pail, however adroitly it be managed, cannot descend the soil-pipe in so compact a mass as that

which is suddenly lowered from a basin by the quick opening of a valve or plunger at its bottom, particularly where the overflow of these closets is closed by a float arrangement, hereafter to be described. The results of these experiments proved this to be the case. Much more powerful siphoning action is continually being produced in practice in houses than was given by these tests, and the deductions based upon them which gave rise to the trap-vent law in many cities must be radically changed. For they showed that S-trap, ventilated as they did it, and subjected to this strain, was secure, whereas a heavier strain or a different method of venting may break its seal as I have described.

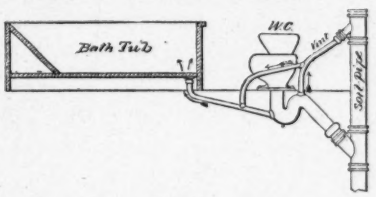


Fig. 94.

The experiments of Hellyer in England form a better basis for plumbing legislation, inasmuch as his tests were made with those water-closets and other fixtures in common use in England which produce a much severer effect.

Traps.

A trap is a siphon placed in the drain to catch some of the water discharged from a fixture and form with it a barrier for the entrance of air from the drains into the house. The water forms what is called the trap "seal." In addition to the water seal some form of mechanical closure has sometimes been added in the form of a valve, gate or ball, under the supposition that a water seal alone could not afford sufficient security. But the mechanical devices have now been found to create serious obstructions to the flow of the water, and to become, in time, corroded or in other ways more or less defective. At the same time it has been

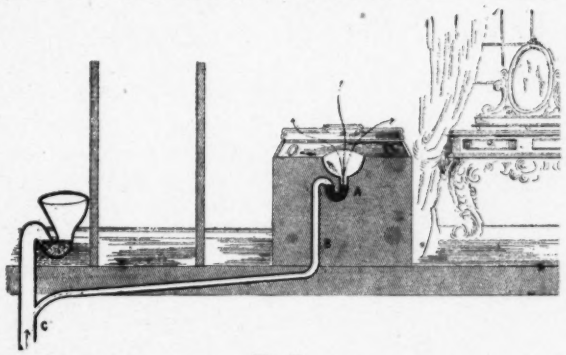


Fig. 95.

clearly shown that a sound water seal can be attained, which affords entire security, and alone, so that the complication of a mechanical seal becomes entirely superfluous.

In my last lecture I gave the principal reasons why special trap venting is now considered undesirable, as adding dangers much greater than that which it pretends to remove, the danger from evaporation, for instance, being, as houses are now plumbed, much greater than that from siphonage. Traps are left in disuse, and subject to the danger of loss of seal by evaporation much oftener than is generally supposed. Thus they are unused in city houses which are left unoccupied during summer; in country houses which are unoccupied during winter; in hotels and apartment houses during the quiet seasons, or at times when they are only partly filled; in private houses in the spare chambers reserved for visitors; in business offices between the expiration and renewal of their leases; in schoolhouses, and all public and private office-buildings at times of vacation; in houses or chambers closed on account of the absence of their owners for travel, sickness, death or any other cause; in cases of draught, or "cut-off" of water supply for repairs of pipes, rebuilding or other cause; in extra fixtures in houses, and in other places, and at other times which will, upon reflection, occur to the reader. In a few days after a trap has thus been abandoned to the influence of the ventilating current, the time varying with the dryness and velocity of the current and with the volume and amount of exposed surface in the body of the trap, its seal will be destroyed by evaporation. Sewer-air will then have

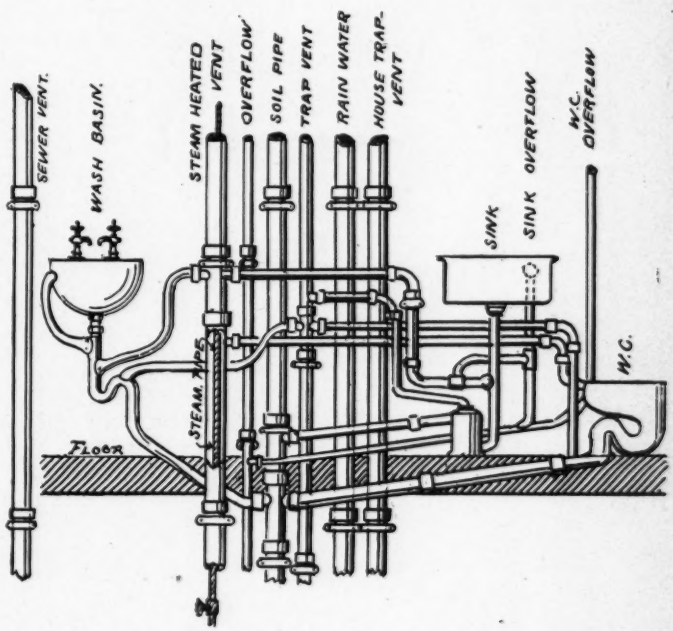


Fig. 96.—Complication of Piping.

an unobstructed entrance into the house, impregnate the carpets, hangings, furniture, walls and all porous substances entering into its construction, and there await the return of the unconscious owner, often doubly unprepared for it after the fatigue of moving.

Corrosion of well-flushed waste pipes of moderate length by sewer air is never to be feared with ventilated soil pipes. It is believed that there is no authenticated case on record of such corrosion. Indeed, the induction through the branch pipes of soil pipe air is by no means an advantage when ample pure air from the room is available after every flushing from a properly constructed fixture. When the main soil pipe is properly ventilated the diffusion of gases, the absorptive power of water for gases, and the frequent water flow through branch pipes afford them sufficient protection when the pipes are in use. When the pipes are not in use

the waste matters adhering to their inner surfaces dry up, and it is believed that what decomposition then takes place goes on so slowly that its corrosive effect on the pipe is practically inappreciable. We have shown that besides the constant draught on the water seal by evaporation, the vent

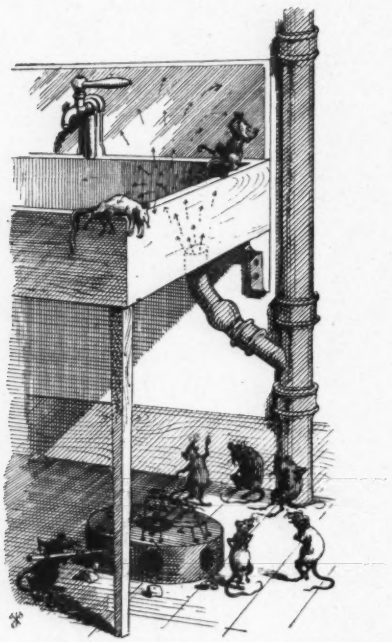


Fig. 97.—Peculiar form of trap found under the sinks of a tenement house whose landlady had received notice from the Board of Health to have traps put under every plumbing fixture.

pipe increases the unscoured area of the trap, and if any portion of a trap not directly scoured by water passing through it is liable to collect sediment, and ultimately clog up, then the mouth of the vent pipe is also subject to this danger. It thus, in a measure, defeats one of its own objects—i. e., to provide a safe trap which shall be self-cleaning, and contain no chamber or corner which shall not receive the full scour of the water passing through this trap. Now, the ventilating openings of traps having been so often found clogged and even completely closed by sediment, we see that this precaution is no certain protection against siphonage and momentum.

Classification of Requirements of Traps.

A proper trap should possess the following characteristics:

(1) It should do its work by means of a water seal alone.

(2) It should be self-scouring.

(3) It should be capable of resisting the severest strains of siphonage, momentum and back pressure that can ever possibly be brought to bear upon it in properly constructed plumbing, even when this plumbing is unscientifically used by the occupants, and this without the aid of special trap ventilation.

(4) It should contain a body of water large enough to be practically proof against evaporation.

(5) It should be simple, of durable material, and economical to manufacture.

(6) It should be so constructed that its interior can be inspected without removing the trap.

(7) It should have a tight-fitting, easily accessible clean-out cap, to admit of removing easily any valuable or foreign substance that may have lodged in any part of it.

(8) It should offer the minimum of resistance to the flow of water through it.

(9) It should be ornamental in appearance.

(10) Finally, it should be independent of the fixture to which it is attached and should be easily connected or disconnected.

Technical Training at the Ohio State University.

RECENTLY, while attending the convention of the Ohio Master Plumbers' Association at Columbus, the representative of "Domestic Engineering" had the pleasure of listening to an address of welcome to the association by Professor Wm. T. Magruder, head of the department of mechanical engineering of the Ohio State University in that city.

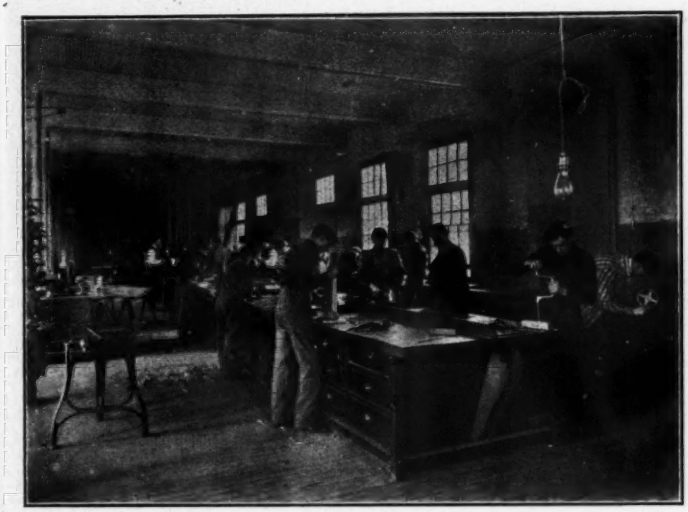
The time was when a college education meant four years of digging at Greek roots and of integrating unknown quantities, winding up with some lectures on moral philosophy and ethics. That that day has clearly gone by was very forcibly shown by the contrast of what the state university has to offer, not only to the more highly educated and wealthier people of Ohio, but also to the sons and daughters of the artisans and mechanics.

We were also favored with a personally conducted trip through a few of the buildings of the university and also through some of the laboratories and shops. These were crowded with both men and women eagerly learning, not only from books, but from their own experiences in forging iron, in tempering steel, in casting metals, in making patterns, in baking bread, in mending a tear in a dress, in the first aid to the injured, or in making drawings and designs, either for their future homes or for machines, which might never be built. It seemed to the writer that at this institution an education could be obtained which is decidedly practical.

A brief history of the university, together with its aims and purposes, may be of interest at this point and we quote as follows from the university catalogue:

"Under an act of congress passed July 2, 1862, the state of Ohio received from the United States a large grant of the public lands for the purpose of establishing a 'college where the leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such a manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and profes-

sions of life.' In accordance with this act, the Ohio State University was founded by the state as a public institution of learning. The governing body of the institution is a board of trustees, appointed by the governor of the state for terms of seven years, as provided in the law organizing the university. The original endowment has been supplemented, and the objects of the university promoted, by a permanent annual grant from the United States, under an act of 1890, by special appropriations of



the general assembly; and in 1891, by a permanent annual grant from the state, which grant was doubled by the legislature of 1896. Through the aid which has been received from the United States and from the state it is enabled to offer its privileges, with a slight charge for incidental expenses, to all persons of either sex who are qualified for admission.

"The university is divided into six colleges as follows:

The College of Agriculture and Domestic Science.
The College of Arts, Philosophy and Science.
The College of Engineering.
The College of Law.
The College of Pharmacy.
The College of Veterinary Medicine.

"Each of the above-named colleges is under the direction of its own faculty, which has power to act in all matters pertaining to the work of the students of that particular college. The aim of the university is to give to the young men and women of Ohio the largest possible opportunity for both general and special training, in order to prepare them for the various duties of life.

"The university is situated within the corporate limits of the city of Columbus, two miles north of the Union depot and about three miles from the state capitol. The university grounds consist of three hundred and thirty acres. The western portion, about two hundred acres, is under the management of the College of Agriculture and Domestic Science. The eastern portion is occupied by the principal university buildings, eleven in number, the campus, athletic and drill grounds, a park-like meadow and a few acres of primitive forest."

It was through the building of the College of Engineering that Professor Magruder conducted his visitors after having given them a general idea of the equipment of the university for other lines of study.

"Since the inception of the university," (to quote again from the catalogue), "the College of Engineering has manifested a vigorous and steady growth. To a large extent this growth represents the demand of the people from whom the university derives its support, for it has been the constant policy of the university to enlarge and foster each branch of educational work in response to every intelligent demand. The marvelous industrial progress made in this state and country in recent years is the best indication of the benefits which have already begun to accrue from the enlargement of technical training and from its constant subdivision and expansion."

At present the College of Engineering offers nine four-year courses of study leading to degrees in architecture, ceramics, chemistry, civil engineering, electrical engineering, industrial arts, manual training, mechanical engineering and mining engineering. Two-year courses are offered in clay working, industrial arts and shop work, and in mining.

The instruction necessary to the completion of these various courses of study is given in twenty-three different departments, under eighty-three professors and assistants. In addition, in some of the courses in this college elective work is offered, which may be taken from any of the thirty-seven departments of the university.

We were most particularly interested in the departments of Domestic Science, Domestic Arts, Mechanical Engineering and Industrial Arts, which are more nearly related to the sphere of "Domestic Engineering."

Mechanical Engineering deals principally with the generation of power or effective energy from the forces of nature

and the utilization of this power through mechanical devices. The fundamental science underlying this profession is physics, especially that part of physics relating to mechanics and heat, though mathematics is the medium by which these physical principles are made applicable to practical problems.

The training given in the course is designed to equip men with such general and technical knowledge, that they can enter at once and with equal ease into positions in any of the numerous subdivisions of mechanical engineering,

and adapting themselves to the needs of the situation, can rapidly acquire the experience which is essential to that particular work.

The technical work of the course begins with physics, which is taught by a year's text book course, supplemented by two terms of laboratory work. This is followed in turn by mechanics, mechanism, the strength of materials, bridge stresses, machine design, thermodynamics, prime movers,

steam boilers, shop appliances, hydraulic machinery, and the metallurgy of fuel, iron and steel.

The theoretical principles of these subjects cannot be made real and practical to the student except by an extended system of laboratory courses. Three such are provided, in shopwork, drawing and experimental engineering, respectively. The shopwork course trains the student in those handicrafts in constant use in all mechanical industries, viz., forging, chipping and filing, carpentry, pattern-making, foundry work, and the use of the principal metal-working machine tools.

The course in drawing includes free hand drawing, lettering, projection, descriptive geometry, shades, shadows and perspective and technical drawing, all leading up to the three terms of machine design which teach the student to use this drawing as one of the important tools of his profession.

The experimental engineering, coming in the last year of the course, gives the student opportunity to gain familiarity with boiler tests, determinations of the efficiency of steam power plants, gas engines, hydraulic and refrigerating machinery, measurements of friction, losses of power in transmission, and many other important technical problems, and is of the greatest use to the student in enabling him to face practical work with confidence in himself.

The course in Industrial Arts is designed for those who may desire to occupy positions in the various branches of manufacture, not as engineers, but as practical managers, superintendents or business men.

As the growth of engineering has brought about its subdivisions into many special lines, such as civil, mechanical, electrical, mining and chemical engineering, and established special training for each, so the increase in size, importance and scope of the manufactures of the country has made it desirable to especially train young men with reference to filling positions of trust and responsibility in them: to so educate them that they can readily learn the treatment or processes in any special line of manufacture and be able to intelligently superintend: and that they can initiate and put into successful operation new industrial enterprises, or extend and improve old ones.

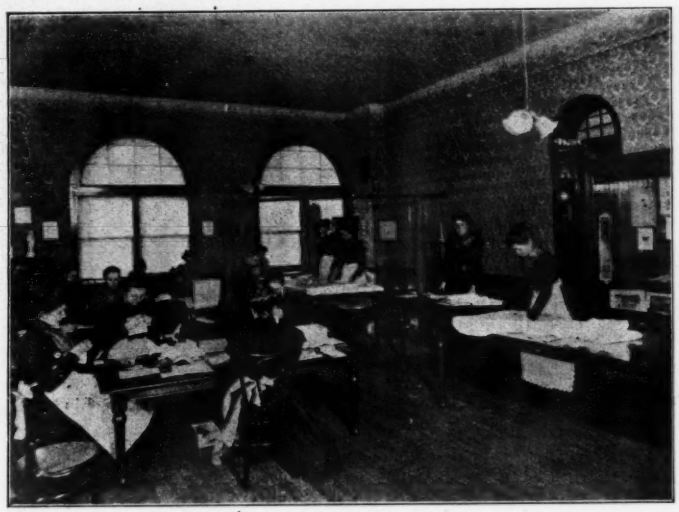
With this idea in view this course has been planned to give the student special training along industrial and business lines, together with a certain amount of general culture. There will be found in the course a large amount of science training by which the process of manufacture based upon these laws may be more readily understood: practice in the different shops and in drawing so that a good working knowledge of such operations may be acquired as well as training given to eye and hand, and power of observation and thought along mechanical lines developed: studies into the principles and methods governing the production of the chief materials of construction, the different mechanical movements and their combination in machinery, the use of materials in various constructions, electrical machinery and steam power plants, together with laboratory practice: also the relations of capital and labor, the problems of trade, and the conduct of business enterprises.

This course is well adapted to meet the needs of those young men already employed in industrial pursuits at the machine or bench, who are ambitious to advance to positions of greater responsibility and influence. This course offers an excellent opportunity to such men: it gives them four

years of earnest work under good instructors to direct and assist personally, and the advantages of laboratory work to supplement the theoretical book-work.

In the mechanical engineering laboratories we saw the different forms of gas and steam engines, boilers and hydraulic machinery being tested, and even recognized two of the well-known soft water hydraulic pumps which are used in that state for pumping cistern water to the bath-room by means of the hard city water. We were told that these pumps are frequently tested for their efficiency by the students.

and are measured to see how much city water is required to pump a given number of gallons of soft water into the attic. The shops of the department of Industrial Arts are quite extensive and include carpentry, cabinet-making, pattern-making, blacksmithing, tool-dressing, molding, core-making and founding in iron and the copper alloys, and bench and machine-work in the machine shops. We saw quite a number of samples of tool-dressing and other



exercises which reflected much credit on the instructors and students. When it is considered what a small number of hours each student devotes to any one of these trades, it is really surprising that they are capable of turning out even passable work of such difficulty and variety in such limited time. Such, however, is shown to be the result of training the hand to do the bidding of the brain after the mind has been instructed in the object of the exercise, and how it can best be done. In the machine shop, the students were building quite a large and ambitious marine engine.

The department which impressed us with the greatest novelty was that of Domestic Science and Art. The primary idea of this department is to give to young women a broader education and equipment for what will in all probability be the life work of most of them. It was planned to appeal to the most womanly side of all women, no matter whether they be country lasses or city girls, and regardless of the size of their father's exchequer. The course is one in Applied Science, and is based upon a rational knowledge of botany, zoology, physics and chemistry. And just as these sciences have been used to advance industrial and mechanical arts, so they are now being used for the advancement of the domestic arts, and to prove to the student why certain colors should not be combined in a dress or bonnet, what is the chemistry of bread-making, and why proper hygienic and sanitary apparatus in a house tends to promote health and happiness. In other words, the idea is to enable our women to be healthier and happier and to be the better able to build ideal homes and to be the mothers of an ideal nation.

Being supported by the state, the tuition is free and the laboratory and incidental fees may be as low as $30.00 per annum. The catalogue states that "the average expenses

of a student in the university, for a year of nine months, excluding clothing and traveling expenses, is $207.00," and that "there is no need of a student spending more than the "average" for the items mentioned; many spend less."

Surely in this day, no one need go without an education, either academic or technical, who possesses the requisits physical and mental abilities and the desire to obtain one.

The Use and Care of the Gasoline Fire.

NO doubt many of our readers have read reports of alleged gasoline explosions in which much damage is done, and one would expect, if a visit was paid to the spot or place where the explosion occurred, to find a wreck covering acres of ground. On the contrary, in the majority of cases little or no damage was done, and the fire pot or torch you expected to find in fragments is usually all there, possibly being used; or, at the worst, all the damage done is that the seams of the tank may be unsoldered by heat. If you investigate you will find that the cause of the trouble was the carelessness of the user. Many times the burner is opened to fill the drip cup, the gasoline lighted, and the user walks away leaving the gasoline running. The result is that the gasoline will run faster than it burns, and if attention is not given it will overflow the drip cup, run down over the tank onto the floor or bench, making a big blaze. About this time the careless user puts in an appearance and immediately decides that the fire pot has exploded. Now the danger to the user comes in. If he is cool and will simply shut the needle he so carelessly left open, push the fire pot on a few inches out of the fire (all of which he can do without singeing a hair), the gasoline will stop running, and what little there is out burns up quickly and little damage will be done. If, however, the user gets heroic and proceeds to throw the fire outdoors, he usually succeeds in getting a good burn—as the gasoline will probably get on his clothes. In many cases, if the fire was left alone all the damage it would do would be to unsolder all the seams of the tank and burn up the gasoline. Should it happen that anything inflammable was directly over the flame and close to it, no doubt it would burn; otherwise about all the damage done would be from the smoke, as gasoline don't burn down and won't set fire to a flat surface on which it is burning.

In view of the fact that there are thousands of gasoline fire pots and torches used by the trade, we are pleased to call our readers' attention to an article prepared by Clayton & Lambert Mfg. Co., of Detroit, Mich., who have devoted fourteen years to the careful study of the building of gasoline fires for mechanical purposes, and whose fires are used in every country where gasoline is known. They say that the trouble comes through the user's fear and lack of knowledge. The average user of a fire pot or torch is afraid of it, and don't understand the principles on which it is made, and if for any reason it don't work just as they think it should, it is thrown outdoors or into the scrap, and that particular make is condemned and a different one ordered. All that is necessary to get good service out of a gasoline fire is to treat it right.

DON'T HIT IT WITH AN AXE.

It is impossible to make a gasoline fire pot or torch that will do first-class work for years without any attention. Even a wheelbarrow needs oiling occasionally, or you will hear from it.

There is no mystery about building gasoline fires; they all work on the same principle, although it may be applied a little differently. Let us tell you how they are made.

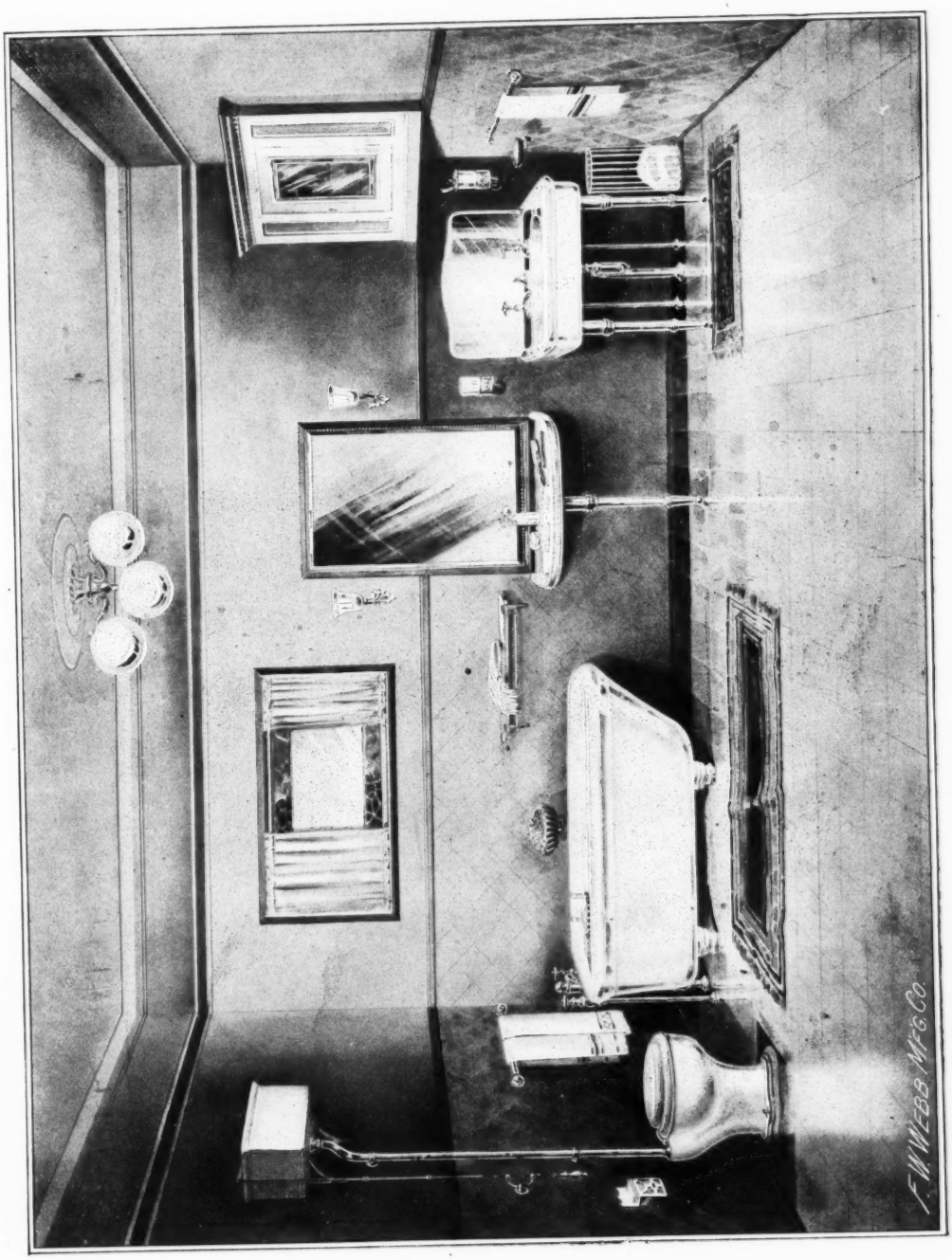
The tanks for all gasoline fire pots or torches are made to hold the gasoline, and must be constructed so that they will hold an air pressure, as air is used to force the gasoline up to the burner. If the tank leaks air the fire will not work well and it will be necessary to pump it up often. The tanks are usually supplied with an opening for filling, some kind of pump or bulb for putting in the air pressure, and a supply pipe that carries gasoline from the bottom of the tank to the burner. When the fire pot or torch is right side up, the air pressure forces the gasoline up this supply pipe to feed the burner. If the air pressure escapes, the gasoline will gradually fall back out of the pipe and the fire will go out. *Remember* that with nearly all burners the heavier the air pressure is the better the fire will be.

Now about the burner. All gasoline burners depend upon heat to make the gas they burn; it is therefore necessary to heat the burner first when starting a fire. This is usually done by burning gasoline in the drip cup provided for that purpose. The burner on any gasoline fire gets dirty from sediment formed by heating gasoline, and if this sediment is not removed the veins of the burner gradually fill up and finally the burner won't work. Nearly all burners are fitted with clean-out plugs so that they may be easily cleaned.

Examine your fire pot or torch carefully; try to understand how it is made and the object in having everything just as it is; don't be afraid of it.

IF YOUR FIRE POT OR TORCH DON'T WORK: First see that the tank is nearly full of gasoline and then screw the filler plug tight. If the washer is old or worn replace with new, made of leather (never use rubber), or if leather is not handy take a piece of cotton string and soap it, using the soap as you would wax in waxing a thread. Then wind the string to the right so that when the plug is screwed to place it will tighten the string. See that there is no leak around the pump collar; if this washer is old, renew as described above. Now see that the pump works right. All air pumps need oiling often, as they heat in use, and this dries the cup leathers. A dry cup leather means a poor pump; therefore oil pump often. A few drops at a time and often will make a pump last many years. After pumping in a good heavy pressure of air, and before trying to light the fire, turn it upside down; this brings the gasoline in the top part of the tank, and should there be a leak you will soon find it. If it leaks repair it. A leaky tank means a poor fire. If the tank is tight turn the fire right side up, and if the burner is mounted on a swivel, see that it is in position so that the gasoline will fill the drip cup and also stand in the iron plate under the flat part of the burner. If the burner is rigid it will be in the right shape.

To fill the drip cup open needle point slightly, and when full close the needle point. Light with match and let burn out, then open needle a little and light again, letting it burn low until burner is thoroughly hot. Then you should have a good flame that will do good work. If the burner smokes or does not give a blast when the tank is tight and the air pressure good, it will indicate that the burner is dirty and



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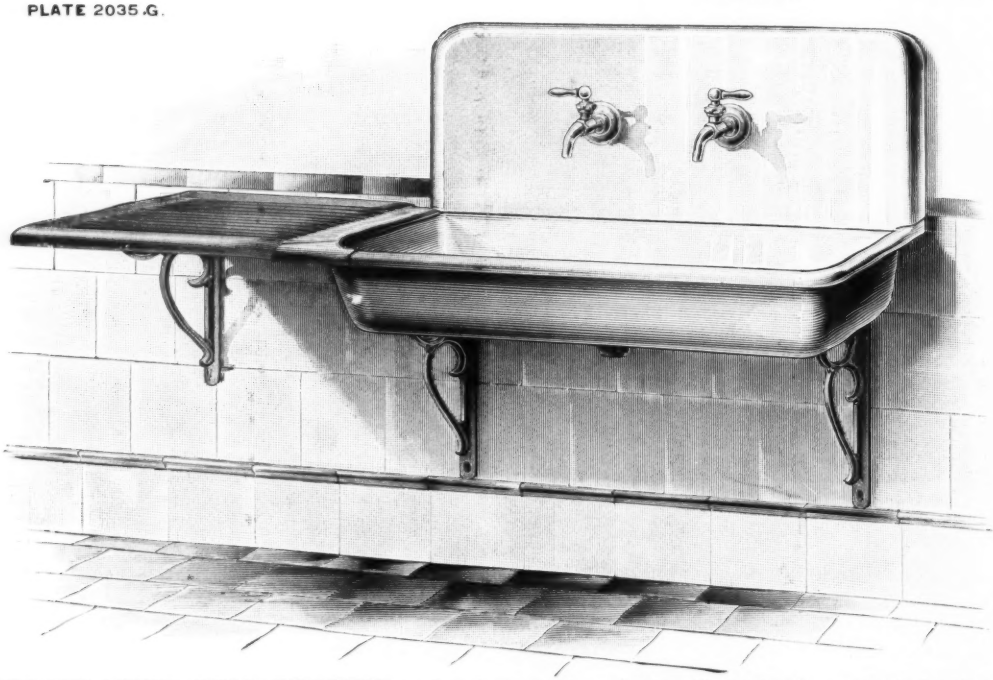

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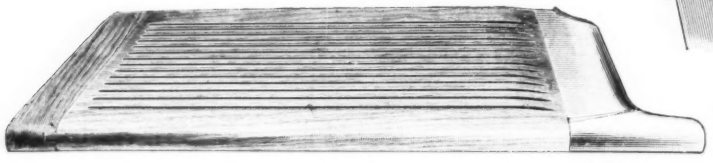

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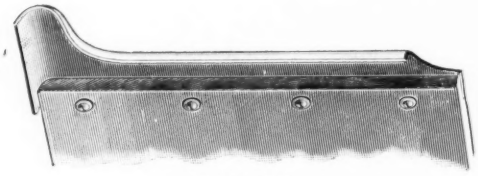

END VIEW.

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needs cleaning. To do this, take the burner and swivel off the fire pot and take out all clean-out plugs. (If they stick tap them lightly with a hammer and they will unscrew easily.) After forcing out all dirt with a fine wire wash the burner in gasoline; soap the plugs and screw them in place. *Don't take the swivel apart.* Remove the wire strainer cloth from little end of swivel (the best way to do this is with a small drill), and replace it with new made of No. 60 strainer cloth rolled up tight and forced into the hole. This keeps out lint and dirt, saves cleaning burner as often as would be necessary if it was not used, and it also helps vaporize the gasoline.

Remember the gasoline tank must be air tight; the filler plug and pump must be screwed down so air does not escape; the pump must be oiled often and a good pressure of air put in the tank; the burner must be kept clean. Use leather or cotton string for washers. *Don't use rubber*—gasoline dissolves it. Use 74° Stove Gasoline and be sure that the measures or cans in which it is handled are used for nothing else. *A teaspoonful of kerosene, or any oil or paint, would ruin* a gallon of gasoline, as it would quickly clog burners.

If our readers who are users of gasoline fires will save this article, we feel sure it will prove valuable to them.

Ventilation.

By A. C. Hardy, M. E.

WRITERS of eminence on this theme state boldly that "man's own breath is his greatest enemy." How much truth there is in this is best shown by well authenticated statistics. "The purity of the atmosphere habitually respired," says Carpenter, "is essential to the maintenance of that power of resisting disease which, even more than the ordinary state of the health, is a measure of the real state of the system." For, owing to the extraordinary capability which the human body possesses of accommodating itself to circumstances, it not unfrequently happens that individuals continue for years to breathe a most unwholesome atmosphere without apparently suffering from it, and thus when at last they succumb to some epidemic disease, their death is attributed solely to the latter, the previous preparation of their bodies for the reception and development of the zymotic poison being altogether overlooked. It is impossible, however, for anyone who carefully examines the evidence to hesitate for a moment in the conclusion that the fatality of epidemics is almost invariably in precise proportion to the degree in which an impure atmosphere has been respired, and that, by due attention to the various means of promoting atmospheric purity, and especially efficient ventilation and sewerage, the rate of mortality may be enormously decreased, the amount and severity of sickness lowered in at least an equal proportion, and the fatality of epidemics almost completely annihilated. And it cannot be too strongly borne in mind that the efficiency of such preventive measures have been most fully substantiated in regard to many of the very diseases in which the curative power of medical treatment has seemed most doubtful, as, for example, cholera and malignant fevers. It can also be shown that the outbreaks of disease are coincident with individual overcrowding.

Want of fresh air aggravates all diseases, increases the power of infection, retards the convalescence, and hastens the death of the sick. In addition, it lowers the tone of the healthy, and is the most potent of all agents in the propagation of destructive lung diseases. This was very fully shown in the report of a royal commission appointed in 1857 to inquire into the health of the English army. The death rate of Her Majesty's guards was more than 20 per 1,000, 67 per cent greater than the death rate for the same ages in Manchester, the most unhealthy town in England, and double the death rate for all England, and three times the rate of the country districts. As regards lung diseases in the guards the death rate was nearly 12 per 1,000 among men who should be in their prime; this is a rate more than the total mortality from all causes for all England for males of the same age. Steps were taken leading to more space per head in barracks, and a certain standard of air renewal per capita per hour. The result was soon seen in the reduction of deaths from lung diseases to 2½ per 1,000. Truly must our breaths be feared when strong, healthy men under discipline, well fed and clothed, can unconsciously poison themselves and destroy one-half their expectation of life. Where a body of men having passed a rigid medical examination, excluding all those ailing or having any predisposition to disease, so suffer from indiscretion and ignorance, what a wholesale destruction we must expect among the overworked and underfed classes! It is not shown that the overcrowding and stagnation of atmosphere in the barracks of the English army was worse than that found in habitations of the more wretched of the laboring classes; yet the mortality was higher. May not this apparent anomaly be explained by the fact that a contaminated atmosphere may be breathed almost with impunity in hours of activity which would produce serious ailments if breathed when the system is in repose? Is not the inaction of barrack life relatively a state of repose to healthy men in the prime of life? In civil life, starvation, poverty and overcrowding are hardly sufficient to produce the same results found by this commission to exist in the English army. That the mortality is not relatively higher among the poor is partially explained by the wretchedness of their dwellings, and the very necessities of their poverty bringing about activity and an air renewal which has saved them from extermination.

Air is the prime necessity of life. Food or water may be abstained from for a considerable time, and we may have an opportunity of replenishing either should we doubt its purity or wholesomeness, but the atmosphere around us we must breathe or die.

Air consists of a mechanical mixture of oxygen and nitrogen by volume in the proportion of 21 per cent of the former to 79 per cent of the latter, with small quantities of carbonic acid, moisture, organic matter, etc. By respira-

tion or combustion, air becomes vitiated—the oxygen diminishing and the carbonic acid and organic and suspended matter increasing. In the act of respiration, oxygen derived from the atmosphere combines with carbon and hydrogen given out from the lungs, the carbon being transformed into carbonic acid, and the hydrogen into aqueous vapor.

Careful experiments show that our breath contains .04 per cent carbonic acid gas; and, assuming a consumption of 16 cubic feet of air per hour, we have an hourly production of 16x.04, or .64 of a cubic foot of carbonic acid gas; and as the specific weight of carbonic acid gas is 1.52 times that of air, which is, at 62 degrees Fahr., .076 of a pound per cubic foot, we have, therefore, 1.52x.076, or .11552 of a pound as the weight of a cubic foot of carbonic acid gas; as we have .64 of a cubic foot produced per hour, we find, by multiplication, that we have by weight .073728 of a pound of carbonic acid gas, and as it is composed of 27 per cent of carbon by weight, we find, by multiplication, .073728x.27, or .0199056 of a pound of carbon as the actual weight of carbon burned to carbonic acid gas under the assumed conditions. Taking 12,905 heat units, Dulong's value for carbon, we have .0199056x12,905, or 246 heat units as the amount of heat given out per hour per individual.

The estimation of the weight of hydrogen burned to water per hour in our lungs presents more difficulties. Dr. Mayer, in his essay on organic motion and nutrition, places the heat due to the combustion of hydrogen as nearly one-fourth that of the carbon. The 16 cubic feet of air at 82 degrees Fahr. exhaled, saturated, would carry per cubic foot .0016 of a pound of water, and assuming 75 per cent saturation for the air before inhalation, we have .75x.0016 or .0012 of a pound of water in a cubic foot of air; and deducting this amount from the saturated exhaled air we have .0004 of a pound of water per cubic foot, and multiplying this by 16 we have .0064 of a pound of water as the amount of water in the breath, the direct product of the combustion of hydrogen supported by oxygen; as hydrogen is by weight .125 of the weight of water we have .0064x.125, or .0008 of a pound of hyprogen burned to water per hour.

Taking the caloric value for hydrogen, 62,535 heat units, we have .0008x62,535, or 50 heat units, the product of the combustion of .0008 of a pound of hydrogen per hour. We have then as the product of the carbon, 246 heat units, and 50 heat units as the product of the hydrogen, or a total of 296 heat units emitted per adult per hour.

This heat is carried off: (1) by radiation of walls; (2) by contact with cold air, and (3) by perspiration, the heat of the body vaporizing water.

The first and second means of getting rid of heat can only go on when our surrondings are cooler than ourselves, which is not always the case; in extreme cold, these are the only outlets for heat we have, perspiration being suppressed. The third means of ridding ourselves of our surplus heat is by the withdrawal of heat by the refrigeration of evaporation.

There are five offices which air, in its relation to animal life has to fill: (1) To supply the organs of respiration with the necessary amount of oxygen; (2) to carry off the vapor given off by the body and lungs; (3) to carry off and dilute the exhalations from the skin; (4) to carry off the animal heat not absorbed by radiation or vaporation, and (5) to supply the oxygen necessary to support the combustion of gas or oil consumed for illuminating.

An ordinary man in a state of repose makes about 16 respirations a minute, of 28 cubic inches volume, making a gross of 16 cubic feet of air vitiated per hour. The amount of air required to carry off the vapor varies with the temperature. Should all the animal heat have to pass off through the pores by vaporization alone we should have to evaporate per hour an amount of water which should carry off our total 296 heat units. The temperature of the human body is 98 degrees Fahr., and to evaporate one pound of water from this temperature to aqueous vapor of the same temperature would require 1,178 heat units. At 98 degrees Fahr. one heat unit will evaporate .000925 of a pound of water and 296 units would evaporate 296x.000925, or .274 of a pound of water; which is the greatest possible amount of evaporation possible, radiation and loss of heat by contact being suppressed. This means a loss by surface evaporation of over one-fourth of a pound of water per hour, and, though excessive and very enervating, is exceeded many fold without serious harm by men undergoing severe labor and subjected to great heat.

Under ordinary conditions and surroundings the human body evaporates, according to Dumas, .0836 of a pound of water per hour, or about one-tenth of the total. Air at 62 degrees Fahr., saturated 70 per cent, is capable of absorbing, per cubic foot, .00026 of a pound of water; and to absorb .0836 of a pound per hour would require .0836 divided by .00026, or 320 cubic feet; hence, 320 cubic feet are required to carry off the moisture imparted to the atmosphere by our bodies per hour. As the air which has been respired is saturated, it cannot aid further. We must conclude that for the purposes of respiration and vaporization alone, 16 plus 320, or 336 cubic feet, are required.

The air required to carry off the exhalations from the skin varies very much with the health and personal habits of the individual. For hospitals, in the time of epidemics, 5,000 cubic feet per hour per patient may be placed as a maximum, and never less than 1,600 for wards where the mild types of disease are under treatment. For cleanly and healthy persons pursuing ordinary occupations, the air admitted for respiration and vaporization is sufficient to take care of the skin exhalations. Of our animal heat we have dissipated 28 per cent by vaporization and have left 72 per cent which must be taken care of by radiation or contact with cold air. We cannot wholly rely on radiation, because it acts and reacts in a crowded room and an undue elevation of the temperature is the result. The air by contact must carry out this 213 heat units. In practice it is well to allow for the admission and withdrawal of such a quantity of air as shall in no case allow of the temperature in the room rising more than 20 degrees from the proposed mean. The specific heat of air is .238; its weight per cubic foot at 62 degrees Fahr. is .076, and, with an allowance of 20 degrees as the extreme range of tempera-

ture, we have 213 divided by the product of .238x.076x20, or 588 cubic feet, which will be required to absorb the 213 heat units.

Under average conditions, with the aid of radiation, about 300 cubic feet of air for contact will suffice to keep the temperature within range. With 300 cubic feet of air for contact, the amount of heat left for radiation becomes 300x.238x.076x20, or 108 heat units, leaving 213 — 108, or 105 heat units for dissipation by radiation. With 16 cubic feet for actual respiration and 320 cubic feet for vaporization, which, in turn, may bear off the exhalations of the skin and be the recipient by contact of the heat not absorbed by vaporization or radiation, we may feel safe from air-famine or air-fouling in its worst forms. These figures may be placed as the minima for healthy persons dwelling in rooms very thinly occupied and not pursuing active employment.

Pure air, according to eminent analysts, contains 4 parts of carbonic acid gas in 10,000, and the same authorities find in our breath 4 parts of the same gas in 100; hence, our breath contains 100 times as much carbonic acid gas as air. Very unpleasant effects are produced by breathing for a short time only air containing 50 parts of the same gas in 10,000. From eight to ten volumes of this gas per 10,000 may be respired without serious injury, though many high authorities place six as the limit.

Assuming that pure air contains 4 parts of carbonic acid gas in 10,000, and our breath 100 times this amount, or 400 parts, it follows that, if we wish to keep the proportions of carbonic acid gas down to a standard of 8 parts in 10,000 we must supply 100 times the volume of air vitiated, and as this is shown to be 16 cubic feet per hour it follows that, on this assumption, 1,600 cubic feet of air are required per hour.

We have next to consider the amount of air required to support the combustion of our illuminating gas. Gas is so generally used that we may disregard other methods of illumination for the present. The heat developed and the quantity of air required to support the combustion of our common coal gas may be estimated with reasonable accuracy. The specific gravity of the ordinary coal gas of commerce is about .42, air to 60 degrees Fahr. being taken at unity. According to Dr. Ure, 14.58 pounds of air are required for the combustion of one pound of gas. Multiplying the specific gravity of the gas by the weight of air at 60 degrees Fahr., we have .032 of a pound as the weight of a cubic foot, and multiplying this by 14.58, we have .46 of a pound as the weight of air required for the combustion of a cubic foot of coal gas; dividing .46 by .076, we have 6 cubic feet as the number of feet of air required for every foot of gas burned.

The average burner consumes about 5 feet of gas per hour, hence, 30 cubic feet of air would be required per hour per gas jet. The mean of a number of careful experiments on the heating power of ordinary illuminating gas, as conducted by Morin, gave 696 units per hour per cubic foot. Assuming that the ordinary gas jet consumes 5 cubic feet of gas per hour, we have 3,480 heat units as the product of the combustion of 5 cubic feet of gas. Assuming that it is not prudent to allow the products of combustion and the air warmed to attain a temperature over 25 degrees Fahr. above the general temperature of the room, we have the total heat units emitted per hour, divided by the range in temperature, multiplied by the specific heat of air, multiplied by the weight per cubic foot, or 7,073, which is the number of cubic feet of air rendered unfit for respiration per gas jet per hour. We may safely assume that 336 cubic feet per individual per hour will suffice under the most favorable circumstances where the occupant is cleanly, healthy, has a large room, and is not actively employed.

This allowance will be found sufficient only in rooms subject to that natural air renewal of which little is known, the traces of which we find in the dark streaks of deposits of dust, noticed on plastered walls and ceilings between the laths. Where the room is at all crowded we must add not less than 600 cubic feet to take care of the animal heat now given up to the air, where before it had been largely dissipated by radiation to the walls. Still, with even this allowance, we are subjecting the occupant to an atmosphere which many authorities would consider unwholesome. To place ourselves on the safe side, it will be well to allow and provide for the admission and withdrawal of not less than 1,600 cubic feet per adult per hour. Recapitulating, we have 1,600 cubic feet per adult per hour to maintain atmospheric purity and carry off the heat and exhalations from the body, and 1,400 cubic feet for the combustion of one cubic foot of coal gas and the maintenance of a proper standard of air purity. Each adult must lose, per hour, 213 heat units by contact with air or by radiation to surrounding objects; each cubic foot of gas burned generates 696 heat units.

With the above data, the calculation of the size and number of openings under given conditions to admit known quantities of air and withdraw the same, becomes comparatively easy. Given the number of occupants, the character of their employment, the duration of such occupancy, and the size of the building and its exposure, with the number of cubic feet of gas burned per hour, and we can calculate the coal or fuel required to maintain a certain temperature with a certain standard of air renewal.

We have now to provide for the continuous admission and withdrawal of certain quantities of air and its proper heating. Air is a gas, and like all gases, very sensitive to changes in temperature. The temperature of the human body being 98 degrees Fahr., and the ordinary temperature of this climate, and in fact all climates, being somewhat less, we find a constant circulation of air passing up the body, due to the higher temperature of the body warming the air in contact, which losing weight per given volume is displaced by heavier air, which in turn loses its relative density, and so on a continual circulation upward is maintained around the body; this should throw some light on the best method of ventilating our dwellings.

The temperature of our breath is about 82 degrees to 85 degrees Fahr., is saturated, and contains, among other elements, 4 per cent carbonic acid gas. The weight of a cubic foot of saturated air of 82 degrees is .07285 of a pound, as it contains 4 per cent carbonic acid gas of 1.5 specific gravity. It is ascertained by computation that the

above mixture of air, aqueous vapor, and carbonic acid gas weights, at 82 degrees, .074306 of a pound per cubic foot. This corresponds to the temperature of a cubic foot of air, 70 per cent saturated, of 75 degrees Fahr. As the usual temperature of halls, public buildings and inhabited rooms ranges from 70 degrees upwards, it follows that the ascending force, due to the increased rarity of our breath, is very slight, and that we are saved from the greatest inconvenience by the law of the diffusion of gases, which distributes this carbonic acid and its organic matter over all space.

It still follows that the foulest air, that air which holds the largest per cent of carbonic acid, is to be found nearest the ceilings. Almost perfect ventilation would be secured by removing the foul air by openings near the ceilings, and admitting fresh, warmed air near or at the floor, through numerous openings; but such a system is only applicable to public buildings, and not at all to private apartments. When the external air is colder than the air of the room to be ventilated, considerable natural ventilation will take place through pervious walls and the chinks of windows. The course of this almost imperceptible current will be through the ceiling and the upper portions of the walls, while the supply of fresh air will enter through the floor and lower portions of the side walls. In summer, when our houses are cooler than the outside air, the reverse of this course will be followed by the air currents.

We have two systems of ventilation — the vacuum method, in which the foul air is withdrawn by means of a heated-air shaft, or an air shaft in which exhaustion is secured by some mechanical device; and the plenum method, in which a pressure, slightly in excess of the normal, is secured by some mechanical device, fresh air being forced into the system to be ventilated, displacing four air which escapes by openings, suitably provided.

The first method is the only one applicable to the ventilation of detached private houses. The vacuum method involves a heated vertical flue, or flues, with openings communicating with all the apartments to be ventilated. The problem is the proper proportioning of this flue to its duty, and, where positive action is desired, its proper heating. Any system, to be successful in practice, must in a measure disregard theory and conform to the comfort of the inmates. The coldest air is found nearest the floor, hence the withdrawal of this first, becomes necessary. The purpose of ventilation would be best served by the withdrawal of the air nearest the ceiling, but the loss of heat and discomfort to individuals under this plan, renders it objectionable except for public halls and buildings. We may then safely place the flue opening near the floor. The size of such opening is regulated by the number and character of the occupants and the number of the lights burned.

We must next ascertain the size of the flue opening per individual. Assuming a mean velocity of 4 feet per second in the air-ducts, a velocity not objectionable on account of draft, we have 16 square inches as the flue area required to withdraw 1,600 cubic feet per hour. By the formula for the velocity of falling bodies, we find that 4 feet per second corresponds to .25 of a foot per head of air.

A cubic foot of air of 70 degrees weighs .075 of a pound; 10 cubic feet would weigh .75 of a pound, and 1-4 of a cubic foot would weigh .01875 of a pound. Subtracting we have .7225, as the weight of such a column of air which, reduced, corresponds to a temperature of 85 degrees Fahr.; hence, it follows that if we wish to secure a velocity of 4 feet per second in the flue, we must, by proper heating apparatus, raise the flue temperature from 70 degrees to 85 degrees. An addition of 10 degrees will be advisable where the axhaust system is through flues of considerable length, and has numerous bends, enlargements and contractions, all of which tend to form eddies and counter currents calculated to impede the efficiency of the system. To remove the product of the combustion of one cubic foot of coal gas, and the air contaminated thereby, about 1,400 feet would, under the same conditions, require 14 square inches of flue opening. Under average conditions the loss of effective head at openings in flues, due to friction, eddies, elbows, wall-plates, may be assumed as not exceeding 40 per cent.

One thousand and six hundred cubic feet of air raised from 70 degrees to 85 degrees represents, in caloric, 432 heat units, about 5 per cent. of the caloric value of one pound of coal. This is the fuel expense of ventilation per adult per hour, and does not take into consideration the heat required to raise the 1,600 feet from the external temperature to 70 degrees. This latter factor is variable and has nothing to do with the actual expense of ventilation. The range of temperature in this climate of latitude 41 is, for what is termed the fire months, from a mean of 35 de-

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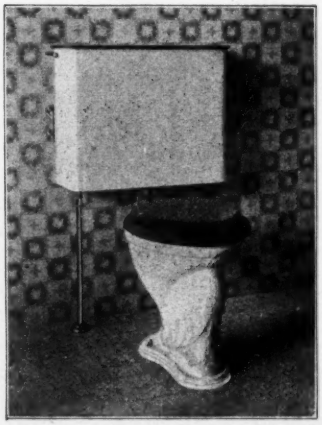

grees to a maximum of 90 degrees. In order to secure a uniform temperature of 70 degrees, we must, in this climate, make provision for heating the out-door air from no degrees to 90 degrees, and provide additional heat enough to resist loss of heat by exposure. This requires a very powerful heating apparatus.

You cannot secure something for nothing in this world. It is not rational to expect to move daily in our homes many tons of air without the expenditure of power and money. If ventilation is wanted it must be paid for. With advance in mechanical science came better-constructed homes and the substitution of stoves and furnaces for the open hearth fire. The improvement in the character of our homes, rendering them more snug and close, and the change in our manner of heating, has had much to do in counteracting the sanitary advance of the age. One of the notable features of modern house construction is the presence of the open fire-place in addition to some general system of house warming.

Where a hot-air furnace is used great care should be exercised lest the heated air attain a temperature above 150 degrees at the register or place of admission to the room. Very few furnaces are so constructed, or proportioned to the work to be done, as to permit the admission and departure of such a volume of air as should keep the air temperature below even 200 degrees at the register. That this is the case is very plain, and is the cause of much inconvenience, and constitutes one of the chief objections to a system of house warming which, considering its cheapness in first cost, has much to recommend itself.

The hygrometric condition of the air of our apartments is a branch of the subject well understood by the profession, but most wholly overlooked by the majority of house-owners. The designers of furnaces supply evaporating pans of about one-fourth the capacity required to supply sufficient moisture to the air. That our rooms are not excessively dry, unpleasantly dry, is explained by the partial saturation of our surrounding air by the skin exhalations —in fact, by the stagnation of the air we breathe, and our almost total lack of proper ventilation.

That our supply of fresh air should not come from the cellar or sewer, should be plain; yet the majority of furnaces are supplied from the cellar, and many again in an effort at economy arrange their furnace flues so as to take what should be a fresh-air supply from the hall. The connection between the cellar of a house and the sewer is much closer than would appear at first sight.

One of the chief points of superiority the hot-water system has over any other is the impossibility of decomposing the air by excessive heat.

The importance of ventilation is not fully appreciated. That confinement and concentration intensify, while dilution and diffusion make innocent most organic poisons, should be borne in mind.

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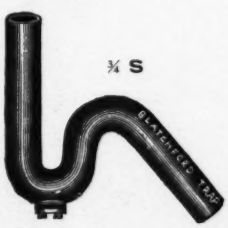

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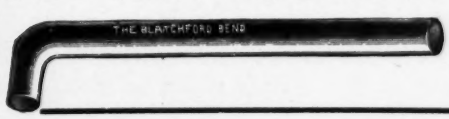

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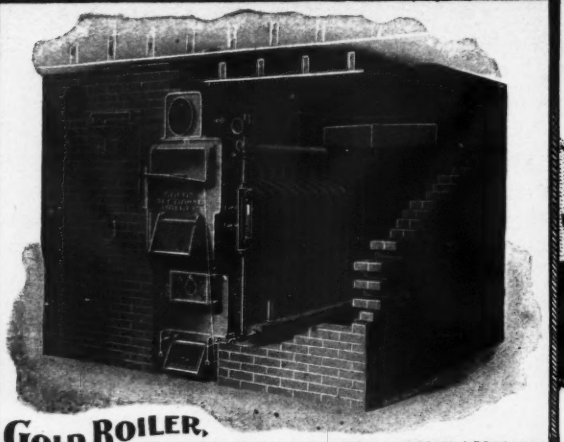

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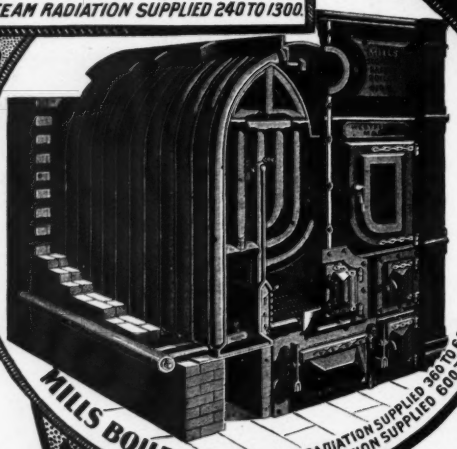

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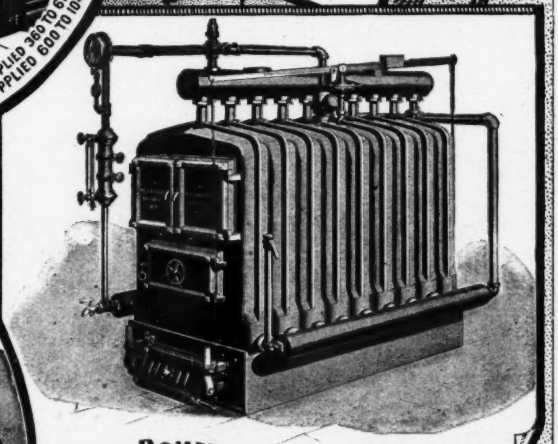

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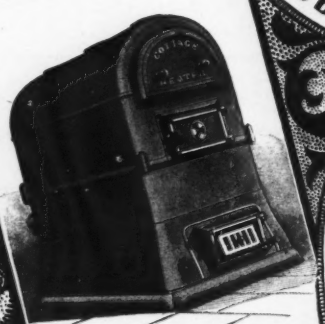

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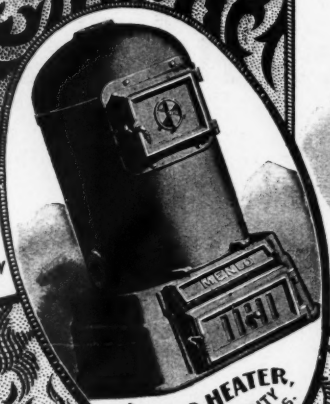

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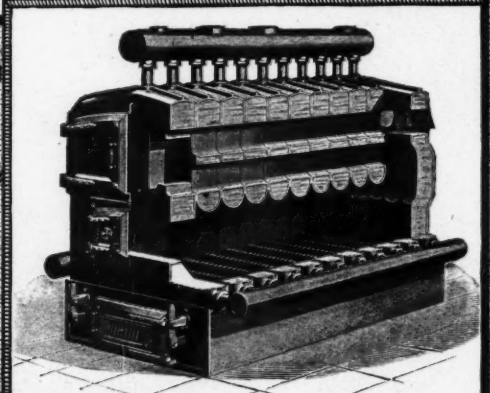

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Furnace Heating.

Furnaces may be divided into two general types known as direct and indirect draft. Fig. 28 shows a common form of direct draft furnace with a brick setting; the better class have a radiator, generally placed at the top, through which the gases pass before reaching the smoke pipe. They have but one damper usually combined with a cold air check. Many of the cheaper direct draft furnaces have no radiator at all; the gases passing directly into the smoke pipe and carrying away much heat that should be utilized.

The furnace shown in Fig. 28 is made of cast iron and has a large radiator at the top; the smoke connection is shown at the rear.

Fig. 29 represents another form of direct draft furnace. In this case the radiator is made of sheet steel plates riveted together, and the outer casing is of heavy galvanized iron instead of brick.

In the ordinary indirect draft type of furnace (see Fig. 30) the gases pass downward through flues to a radiator located near the base, thence upward, through another flue to the smoke pipe. In addition to the damper in the smoke pipe, a direct draft damper is required to give direct connection with the funnel when coal is first put on, to facilitate the escape of gas to the chimney. When the chimney draft is weak, trouble from gas is more likely to be experienced with furnaces of this type than with those having a direct draft.

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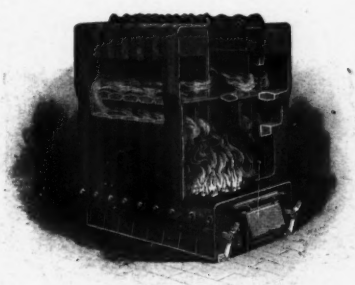

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No part of a furnace is of more importance than the grates. The plain grate rotating about a center pin was for a long time the one most commonly used. These grates were usually provided with a clinker door for removing any refuse too large to pass between the grate bars. The action of such grates tends to leave a cone of ashes in the center of the fire, causing it to burn more freely around the edges. A better form of grate is the revolving triangular pattern and is now used in many of the leading furnaces. It consists of a series of triangular bars having teeth. The bars

Fig. 28.

are connected by gears and are turned by means of a detachable lever. If properly used, this grate will cut a slice of ashes and clinkers from under the entire fire with little if any loss of unconsumed coal.

Fire pots are generally made of cast iron or of steel plate lined with fire brick. The depth ranges from about 12 to 18 inches. In cast iron furnaces of the better class the fire pot is made very heavy to insure durability and to render it less likely to become red hot. The fire pot is sometimes made in two pieces to reduce the liability of cracking. The heating surface is sometimes increased by corrugation pins or ribs.

A fire brick lining is necessary in a wrought iron or steel furnace to protect the thin shell from the intense heat of the fire. Since brick lined fire pots are much less effective than cast iron in transmitting heat, such furnaces depend to a great extent for their efficiency on the heating surface in the dome and radiator, and this as a rule is much greater than in those of cast iron.

Cast iron furnaces have the advantage when coal is first put on, and the drop flues and radiator are cut out by the direct damper, of still giving off heat from the fire pot, while in the case of brick linings very little heat is given off in this way and the rooms are likely to become somewhat cooled before the fresh coal becomes thoroughly ignited.

The body of the furnace above the fire pot, commonly called the dome or feed section, provides a combustion chamber. This combustion chamber should be of sufficient size to permit the gases to become thoroughly mixed with the air passing up through the fire or entering through openings provided for the purpose in the feed door. In a well-designed furnace this space should be somewhat larger than the fire pot.

The radiator, so called, with which all furnaces of the better class are provided, acts as a sort of reservoir in which the gases are kept in contact with the air passing over the furnace until they have parted with a considerable portion of their heat. Radiators are built of cast iron, of steel plate or of a combination of the two. The former is more durable and can be made with fewer joints, but owing to the difficulty of casting radiators of large size, steel plate is commonly used for the sides.

The effectiveness of a radiator depends on its form, its heating surface and the difference between the temperature of the gases and the surrounding air. Owing to the accumulation of soot, the bottom surface becomes practically worthless after the furnace has been in use a short time; surfaces to be effective must therefore be self-cleaning.

If the radiator is placed near the bottom of the furnace, the gases are surrounded by air at the lowest temperature, which renders the radiator more effective for a given size than if placed near the top and surrounded by warm air. On the other hand, the cold air has a tendency to condense the gases, and the acids thus formed are likely to corrode the iron.

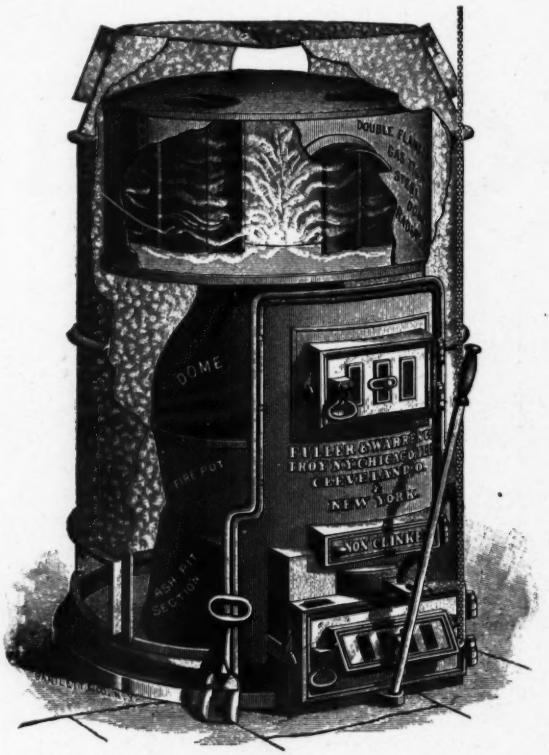


Fig. 29.

The different heating surfaces may be described as follows: Fire pot surface, surfaces acted upon by direct rays of heat from the fire, such as the dome or combustion chamber; gas or smoke heated surfaces, such as flues or radiators, and extended surfaces, such as pins or ribs. Surfaces unlike in character and location vary greatly in heating power, so

that in making comparisons of different furnaces we must know the kind, form and location of the heating surfaces, as well as the area.

In some furnaces having an unusually large amount of surface, it will be found on inspection that a large part would soon become practically useless from the accumulation of soot. In others a large portion of the surface is lined with fire brick, or is so situated that the air currents are not likely to strike it.

The ratio of grate to heating surface varies somewhat according to the size of furnace. It may be taken as varying from 1 to 2.5 in the smaller sizes and 1 to 1.5 in the larger.

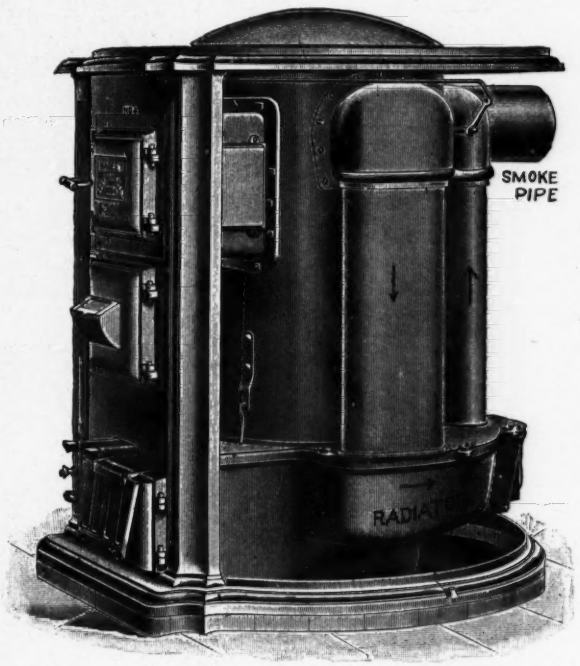


Fig. 30.

Efficiency.

One of the first items to be determined in estimating the heating capacity of a furnace is its efficiency; that is, the proportion of the heat in the coal that may be utilized. The efficiency depends chiefly on the area of the heating surface as compared with the grate, on its character and arrangement, and on the rate of combustion. The usual proportions between grate and heating surface have been stated. The rate of combustion required to maintain a temperature of 70 degrees in the house depends, of course, on the outside temperature. In very cold weather a rate of 4 or 5 pounds of coal per square foot of grate per hour must be maintained.

One pound of good anthracite coal will give off about 13,000 B. T. U., and of these a good furnace should utilize 70 per cent. The efficiency of an ordinary furnace is often much less, sometimes as low as 50 per cent.

In estimating the required size of a first-class furnace with good chimney draft we may safely count upon a maximum combustion of 5 pounds of coal per square foot of grate per hour, and may assume that 8,000 B. T. U. will be utilized for warming purposes from each pound burned. This quantity corresponds to an efficiency of 60 per cent.

Heating Capacity.

Having determined the heat loss from a building by the methods given, it is a simple matter to compute the size of grate necessary to burn a sufficient quantity of coal to furnish the amount of heat required for warming.

As a matter of illustration we may consider the heat delivered to the rooms as made up of two parts: first, that required to warm the outside air up to 70 degrees (the temperature of the rooms), and second, the quantity which must be added to this to offset the loss through walls and windows. Air is usually delivered at the registers at about 140 degrees under 0 conditions outside; this air leaves the rooms by leakage at a temperature of 70 degrees (the normal inside temperature), having lost one-half its heat by conduction, radiation, etc., so that the heat given to the entering air must be twice that which we have computed for loss through walls, etc.

Example: The loss through the walls and windows of a building is found to be 80,000 B. T. U. per hour in zero weather, what will be the size of furnace required to maintain an inside temperature of 70 degrees?

From the above we have the total heat required equal to $80{,}000 \times 2 = 160{,}000$ B. T. U. per hour. If we assume that 8,000 B. T. U. are utilized per pound of coal, then $160{,}000 \div 8{,}000 = 20$ pounds of coal required per hour, and if 5 pounds can be burned on each square foot of grate per hour, then $20\text{-}5 = 4$ square feet required. A fire pot 28 inches in diameter has an area of 4.27 square feet, and is the size we should use.

The following table will be found useful in determining the diameter of fire pot required:

TABLE V.

AVERAGE DIAMETER OF FIRE POT IN INCHES.	AREA IN SQUARE FEET.
18	1.77
20	2.18
22	2.64
24	3.14
26	3.69
28	4.27
30	4.91
32	5.58

If the outside temperature is below 0 the method of computation becomes slightly different. We have seen that in 0 weather a certain quantity of heat is required to raise the temperature of the entering air from 0 to 70 degrees, the temperature of the room, and that a second quantity must then be added to raise the temperature of the air to 140 degrees, which is the usual temperature of delivery at the registers. This last quantity is to offset that lost by radiation and conduction, and must equal the heat loss from the building as computed by the factors given in Tables III and IV. The air has been raised through 140 degrees and 70-140 of the heat supplied has been used to raise it to the temperature of the room and has been lost by leakage; while the remaining 70-140, an equal amount, has been given up by radiation and conduction. In this case we have only to compute the heat loss for radiation and conduction by the

rules given and multiply this result by 2 to obtain the total amount of heat to be supplied by the furnace.

Now take a case where it is 10 degrees below 0. If the air is delivered to the rooms at 140 degrees as before, it must be warmed through 150 degrees. Of the heat supplied 80-150 has been used to raise the temperature of the outside air to that of the room, and only 70-150 for loss by radiation and conduction. As in the preceding example, this latter quantity must equal the computed heat loss through walls and windows; and as it is only 70-150 or .466 of the total amount of heat required, we must multiply it by $1 \div .466 = 2.14$, instead of by 2, as in the first case where the outside temperature is 0.

In the same manner multiply by 2.28 for 20 degrees below and by 2.42 for 30 degrees.

Location of Furnace.

A furnace should be so placed that the warm air pipes will be of nearly the same length. The air travels most readily through pipes leading toward the sheltered side of the house and to the upper rooms. Therefore pipes leading toward the north or west or to rooms on the first floor should be favored in regard to length and size. The furnace should be placed somewhat to the north or west of the center of the house or toward the points of compass from which the prevailing winds blow.

Furnace smoke pipes range in size from about 6 inches in the smaller sizes to 8 or 9 inches in the larger ones. They are generally made of galvanized iron of No. 24 gauge or heavier. The pipe should be carried to the chimney as directly as possible, avoiding bends, which increase the resistance and diminish the draft. Where a smoke pipe passes through a partition it should be protected by a soapstone or

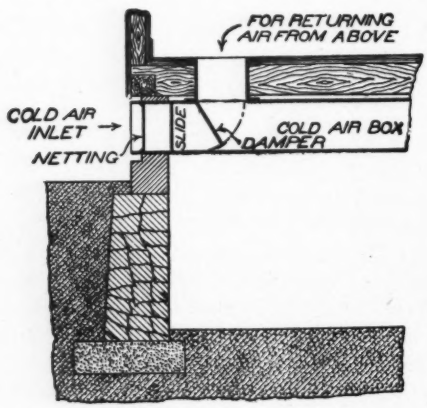


Fig. 31.

double perforated metal collar having a diameter at least 8 inches greater than that of the pipe. The top of the smoke pipe should not be placed within 8 inches of unprotected beams nor less than 6 inches under beams protected by asbestos or plaster with a metal shield beneath. A collar to make tight connection with the chimney should be riveted to the pipe about 5 inches from the end to prevent its being pushed too far into the flue. Where the pipe is of unusual length it is well to cover it to prevent loss of heat and the condensation of smoke.

Chimney flues if built of brick should have walls 8 inches in thickness, unless terra cotta linings are used, when only 4 inches of brick work is required. Except in small houses, where an 8 x 8 flue may be used, the nominal size of the smoke flue should be at least 8x12, to allow for contractions or offsets. A clean-out door should be placed at the bottom of the flue for removing ashes and soot. A square flue can not be reckoned at its full area, as the corners are of little value. To avoid down drafts the top of the chimney must be carried above the highest point of the roof unless provided with a suitable hood or top.

The Cold Air Box.

The cold air box should be large enough to supply a volume of air sufficient to fill all the hot air pipes at the same time. If the supply is too small, the distribution is sure to be unequal, and the cellar will become overheated from lack of air to carry away the heat generated.

If a box is made too small or is throttled down so that the volume of air entering the furnace is not large enough to fill all the pipes, it will be found that those leading to the less exposed side of the house or to the upper rooms will take the entire supply, and that additional air to supply the deficiency will be drawn down through registers in rooms less favorably situated. It is common practice to make the area of the cold air box three-fourths the combined area of the hot air pipes. The inlet should be placed where the prevailing cold winds will blow into it; this is commonly on the north or west side of the house. If it is placed on the side away from the wind, warm air from the furnace is likely to be drawn out through the cold air box.

Whatever may be the location of the entrance to the cold air box, changes in the direction of the wind may take place which will bring the inlet on the wrong side of the house. To prevent the possibility of such changes affecting the action of the furnace the cold air box is sometimes extended through the house and left open at both ends, with check-dampers arranged to prevent back drafts. These checks should be placed some distance from the entrance, to prevent their becoming clogged with snow or sleet. The cold air box is generally made of matched boards, but galvanized iron is much better; it costs more than wood, but is well worth the extra expense on account of tightness, which keeps the dust and ashes from being drawn into the furnace casing to be discharged through the registers into the rooms above.

The cold air inlet should be covered with galvanized wire netting with a mesh of about three-eighths of an inch. The frame to which it is attached should not be smaller than the inside dimensions of the cold air box. A door to admit air from the cellar to the cold air box is generally provided. As a rule air should be taken from this source only when the house is temporarily unoccupied or during high winds.

Return Ducts.

In some cases it is desirable to return air to the furnace from the rooms above, to be reheated. Ducts for this purpose are common in places where the winter temperature is frequently below zero. Return ducts when used, should be in addition to the regular cold air box. Fig. 31 shows a common method of making the connection between the two. By proper adjustment of the swinging damper the air can be taken either from out of doors or through the reg-

ister from the room above. The return register is often placed in the hallway of a house so that it will take the cold air which rushes in when the door is opened and also that which may leak in around it while closed. Check valves or flaps of light gossamer or cloth should be placed between the cold air box and the registers to prevent back drafts during winds.

The return duct should not be used too freely at the expense of outdoor air, and its use is not recommended except during the night when air is admitted to the sleeping rooms through open windows.

Warm Air Pipes.

The required size of the warm air pipe to any given room depends upon the heat loss from the room and the volume of warm air required to offset this loss. Each cubic foot of air warmed from 0 to 140 degrees brings into a room 2.2 B. T. U. We have already seen that in zero weather with the air entering the registers at 140 degrees, only one-half of the heat contained in the air is available for offsetting the losses by radiation and conduction, so that only 1.1 B. T. U. in each cubic foot of entering air can be utilized for warming purposes. Therefore, if we divide the computed heat loss in B. T. U. from a room, by 1.1 it will give the number of cubic feet of air at 140 degrees necessary to warm the room in zero weather.

As the outside temperature becomes colder the quantity of heat brought in per cubic foot of air increases, but the proportion available for warming purposes becomes less at nearly the same rate, so that for all practical purposes we may use the figure 1.1 for all usual conditions. In calculating the size of pipe required, we may assume maximum velocities of 280 and 400 feet per minute for rooms on the first and second floors respectively. Knowing the number of cubic feet of air per minute to be delivered, we can divide it by the velocity, which will give us the required area of the pipe in square feet.

Round pipes of tin or galvanized iron are used for this purpose. The following table will be found useful in determining the required diameters of pipe in inches.

TABLE VI.

DIA. OF PIPE IN INCHES.	AREA IN SQ. INCHES.	AREA IN SQ. FEET.
6	28	.196
7	38	.267
8	50	.349
9	64	.442
10	79	.545
11	95	.660
12	113	.785
13	133	.922
14	154	1.07
15	177	1.23
16	201	1.40

Example.—The heat loss from a room on the second floor is 22,000 B. T. U., per hour. What diameter of warm air pipe will be required?

22,000 ÷ 1.1 = 20,000 = cubic feet of air required per hour. 20,000 ÷ 60 = 333 per minute. Assuming a velocity of 400 feet per minute we have 333 ÷ 400 = 832 square feet, which is the area of pipe required. Referring to Table VI. we find this comes between a 12 and 13 inch pipe and the larger size would probably be chosen.

Since long horizontal runs of pipe increase the resistance and loss of heat, they should not in general be over 15 feet in length. This applies especially to pipes leading to rooms on the first floor or to those on the cold side of the house. Pipes of excessive length should be increased in size for the additional resistance.

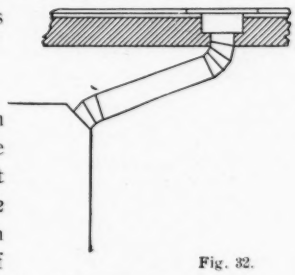


Fig. 32.

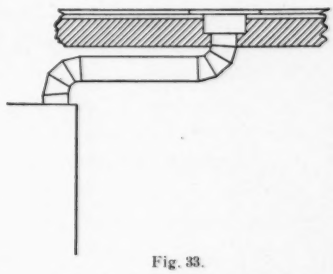


Fig. 33.

Figs. 32 and 33 show common methods of running the pipes in the basement. The first gives the best results and should be used where the basement is of sufficient height to allow its use. A damper should be put in each pipe near the furnace for regulating the flow of air to the different rooms or for shutting them off entirely when desired.

While round pipe risers give the best results, it is not always possible to provide a sufficient space for them and flat or oval pipes are substituted. When vertical pipes must be placed in single partitions, much better results will be obtained if the studding can be made 5 or 6 inches deep instead of 4 as is usually done. Flues should never in any case be made less than 3½ inches in depth. Each room should be heated by a separate pipe. In some cases, however, it is allowable to run a single riser to heat two unimportant rooms on an upper floor. A clear space of at least ½ inch should be left between the risers and studs and the latter should be carefully tinned, and the space between them on both sides covered with tin, asbestos or wire lath.

The following table shows the capacity of oval pipes. A 6-inch pipe ovaled to 5 means that a 6-inch pipe has been flattened out to a thickness of 5 inches and column 2 gives the resulting area:

TABLE VII.

DIMENSION OF PIPE.	AREA IN SQUARE MILES.
6 ovaled to 5	27
7 " " 4	31
7 " " 3½	29
7 " " 6	38
8 " " 5	43
9 " " 4	45
10 " " 3½	46
9 " " 6	57
9 " " 5	51
11 " " 4	58
12 " " 3½	55
10 " " 6	67
11 " " 5	67
14 " " 4	76
15 " " 3½	73
12 " " 6	85
12 " " 5	75
19 " " 4	96
20 " " 3½	100

Having determined the size of round pipe required, an equivalent oval pipe can be selected from the table to suit the space available for running it.

Registers.

The registers which control the supply of warm air to the rooms generally have a net area equal to two-thirds of their gross area. The net area should be from 10 to 20 per cent greater than the area of the pipe connected with it. It is common practice to use registers having the short dimension equal to, and the long dimension about one-half greater than the diameter of the pipe. This would give the following standard sizes for different diameters of pipe:

TABLE VIII.

DIAMETER OF PIPE.	SIZE OF REGISTER.
6	6 x 10
7	7 x 10
8	8 x 12
9	9 x 14
10	10 x 15
11	11 x 16
12	12 x 17
13	13 x 20
14	14 x 22
15	15 x 22
16	16 x 24

Combination Systems.

A combination system for heating by hot air and hot water consists of an ordinary furnace with some form of surface for heating water placed either in contact with the fire or suspended above it. Fig. 34 shows a common arrangement where part of the heating surface forms a portion of the lining to the fire pot and the remainder is above the fire.

Care must be taken to properly proportion the work to be done by the air and the water, else one will operate at the expense of the other. One square foot of heating surface in contact with the fire is capable of supplying from 40 to 50 square feet of radiating surface, and one square foot suspended over the fire will supply from 15 to 25 square feet of radiation.

Care and Management.

The following general rules, taken from "Furnace Heating" by Wm. G. Snow, apply to the management of all hard coal furnaces.

The fire should be thoroughly shaken once or twice daily in cold weather. It is well to keep the fire pot heaping full at all times. In this way a more even temperature may be maintained, less attention required and no more coal burned than when the pot is only partly filled. In mild weather the mistake is frequently made of carrying a thin fire, which requires frequent attention and is likely to die out. Instead, to diminish the temperature in the house, keep the fire pot full and allow ashes to accumulate on the grate (not under it) by shaking less frequently or less vigorously. The ashes will hold the heat and render it an easy matter to maintain and control the fire. When feeding coal on a low fire, open the drafts and neither rake nor shake the fire till the fresh coal becomes ignited. The air supply to the fire is of the greatest importance. An insufficient amount results in incomplete combustion and a great loss of heat. To secure proper combustion the fire should be controlled principally by means of the ash pit, through the ash pit door or side.

The smoke pipe damper should be opened only enough to carry off the gas or smoke and to give the necessary draft. The openings in the feed door act as a check on the fire and should be kept closed during cold weather, except just after firing, when with a good draft they may be partly opened to increase the air supply and promote the proper combustion of the gases.

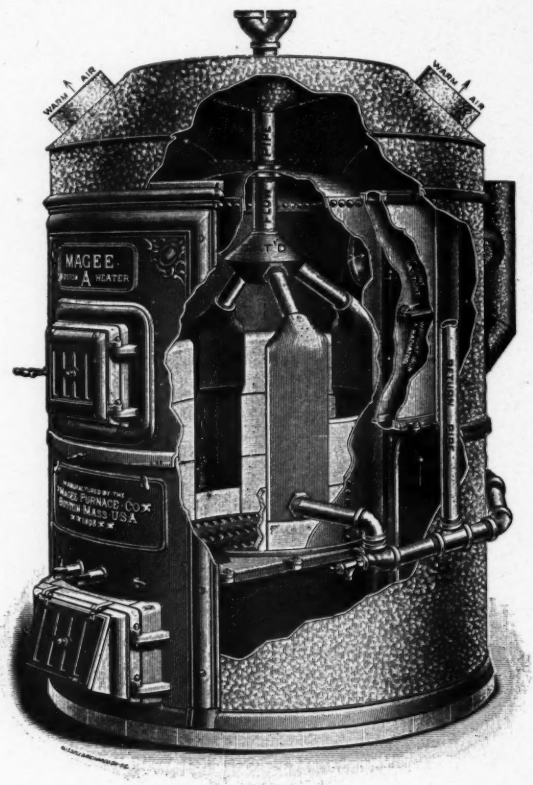


Fig. 34.

Keep the ash pit clear to avoid warping or melting the grate. The cold air box should be kept wide open except during winds or when the fire is low. At such times it may be partly, but never completely closed. Too much stress cannot be laid on the importance of a sufficient air supply to the furnace. It costs but little if any more to maintain a comfortable temperature in the house night and day than to allow the rooms to become so cold during the night that the fire must be forced in the morning to warm them up to a comfortable temperature.

In case the warm air fails at times to reach certain rooms the air may be forced into them by temporarily closing the registers in other rooms. The current once established will generally continue after the other registers have been opened.

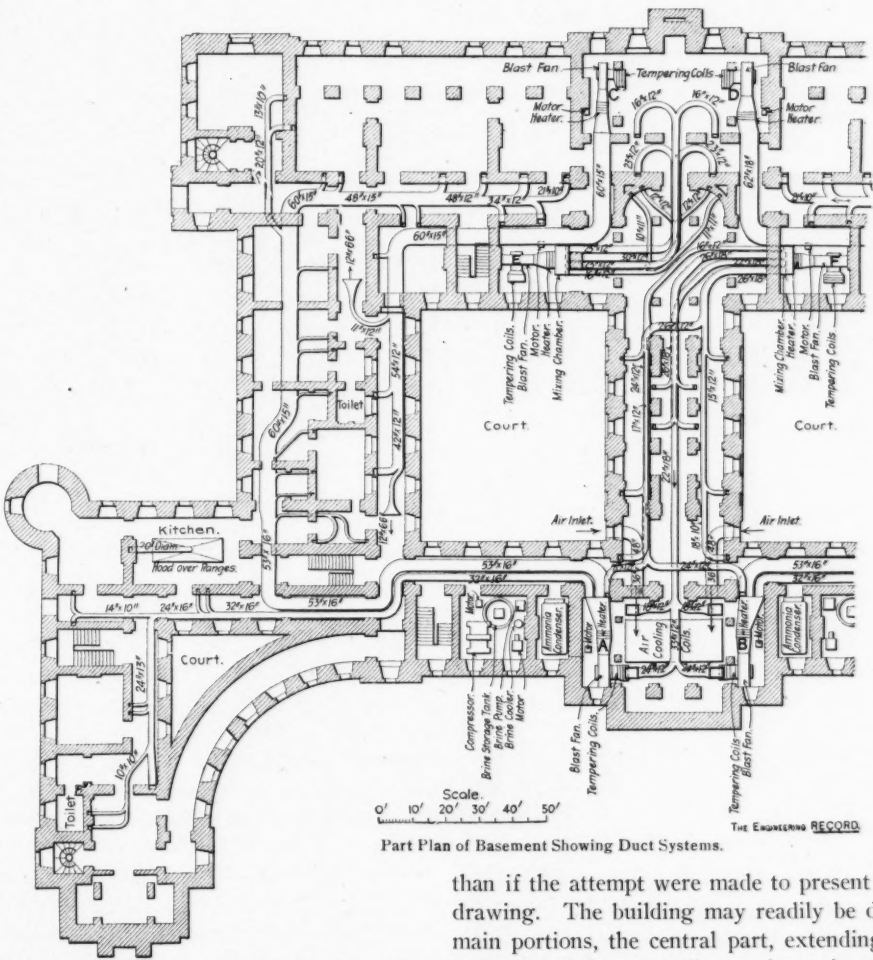
It is the best to burn as hard coal as the draft will warrant. Egg size is better than larger coal, since for a given weight small lumps expose more surface and ignite more quickly than larger ones. The furnace and smoke pipe should be thoroughly cleaned once a year. This should be done just after the fire has been allowed to go out in the spring.

Ventilating and Heating the Palace of the Crown Prince of Japan.

THE palace of the Crown Prince of Japan is a $3,000,000 building to be erected at Tokyo from designs prepared in this country, at least as far as its essential parts are concerned. Included in these is an elaborate system of heating and ventilation with which the building is to be equipped, comprising a hot-blast steam apparatus for warming the main apartments and state rooms, direct radiation for the basement and corridors, and a refrigerating system for reducing the disagreeably high degree of humidity of the air during summer months. Briefly, in addition to 5,285 square feet of direct radiation, including 520 square feet in ceiling coils, there will be required nine fans for circulating the air supply, six belonging to the fresh-air system, moving all told about 95,000 cubic feet of air per minute through heating and tempering coils of an aggregate surface of about 4,500 square feet. The steam is to be supplied from a detached boiler plant, and will reach the basement of the palace through a tunnel. To supply the steam required a 10-inch pipe for the hot-blast coils and a 7-inch pipe for the direct radiators will be necessary. Mr. C. M. Wilkes, of Chicago, is the heating engineer.

This building will be the highest building in Japan, although only two stories, which, however, bring the cornice 60 feet above the ground. It is to be 270x400 feet in extreme dimensions, including wings, and will enclose four courts, two of which are 62x75 feet in size; the inside heights of the stories will be as follows: basement, 13 feet; ground floor, 14 feet 8 inches; first story, 24 feet.

The building is symmetrical about its center line, each half being practically identical with the other; and accordingly only half plans of the ground and first floors are shown in the accompanying drawings. The basement plan is given in two separate half-plan drawings, one showing the duct systems and the other the piping systems, thereby keeping the plans less complicated in their reduced form than if the attempt were made to present both on the same drawing. The building may readily be divisible into three main portions, the central part, extending a short distance each side of the center line, and a main portion, including a frontal wing, on each side of the center. The two frontal wings form an indenting semi-circular facade, at the center of which is the main entrance. There is also an entrance at each wing, and all are connected by a corridor following the curved line of the building front. The central portion is largely corridor space, running from the main entrance to a grand staircase toward the rear. Besides these there is

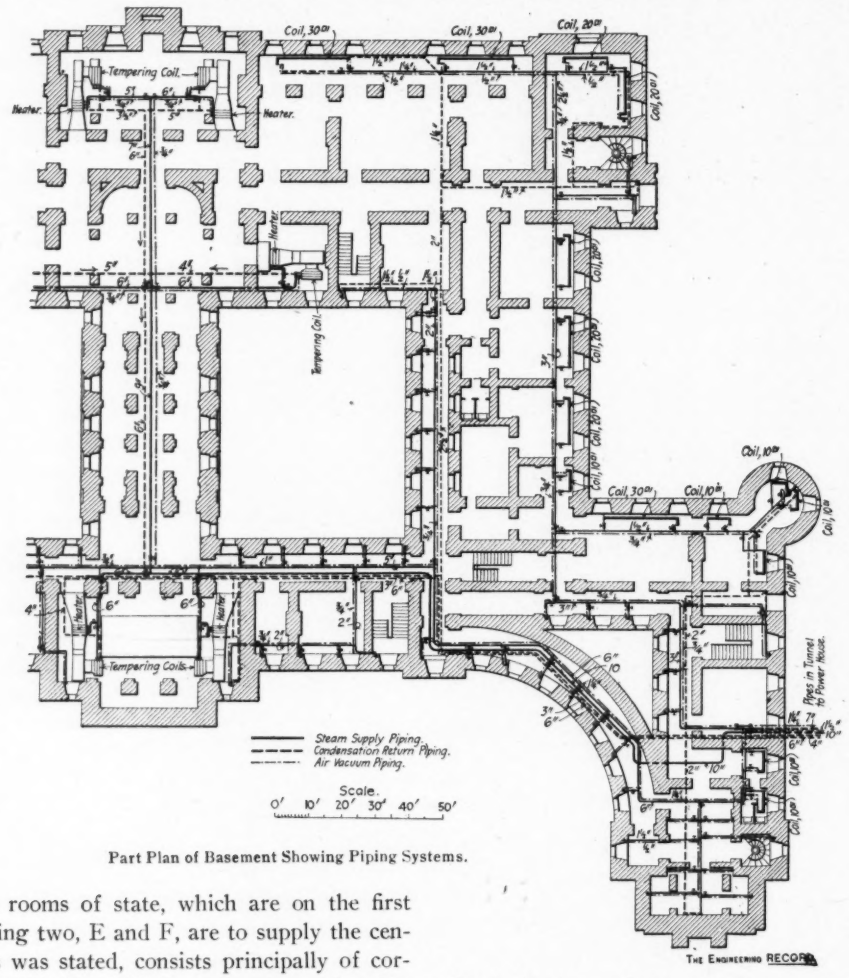


Part Plan of Basement Showing Duct Systems.

a continuous corridor extending around the entire building. Altogether there are about 150 feet of corridor, about 4 feet wide, on each floor.

As already stated, six blowers are to be used for the fresh-air supply. These are grouped near the center line of the building, two at the front of the basement, A and B, and four at the rear. Fans A and B will supply practically all the household rooms, one fan for each main part of the building, and the two at the rear, namely, C and D, will supply the various rooms of state, which are on the first story. The remaining two, E and F, are to supply the central part, which, as was stated, consists principally of corridor space and grand halls, with, however, large drawing rooms at each end. In every case there are tempering coils within the fresh-air inlet, and the fan draws through them and then discharges through the heating coils. Both tempering and heating coils are provided with by-passes, and with the exception of the two blower sets in the front part of the basement, A and B, the tempered and hot air are mixed immediately beyond the heating coils, and the air is carried in single-duct systems. In the case of fans A and B, however, a double-duct system is employed, so that the tempered and hot-air supplies are not mixed until the bases of the various flues are reached. The mixing dampers, including those controlling the tempering-coil by-passes, are all operated by thermostats. All systems receive the fresh air from the courts except the rear pair, C and D, which received air from the outside. The fans are to be driven by rubber belting from electric motors.

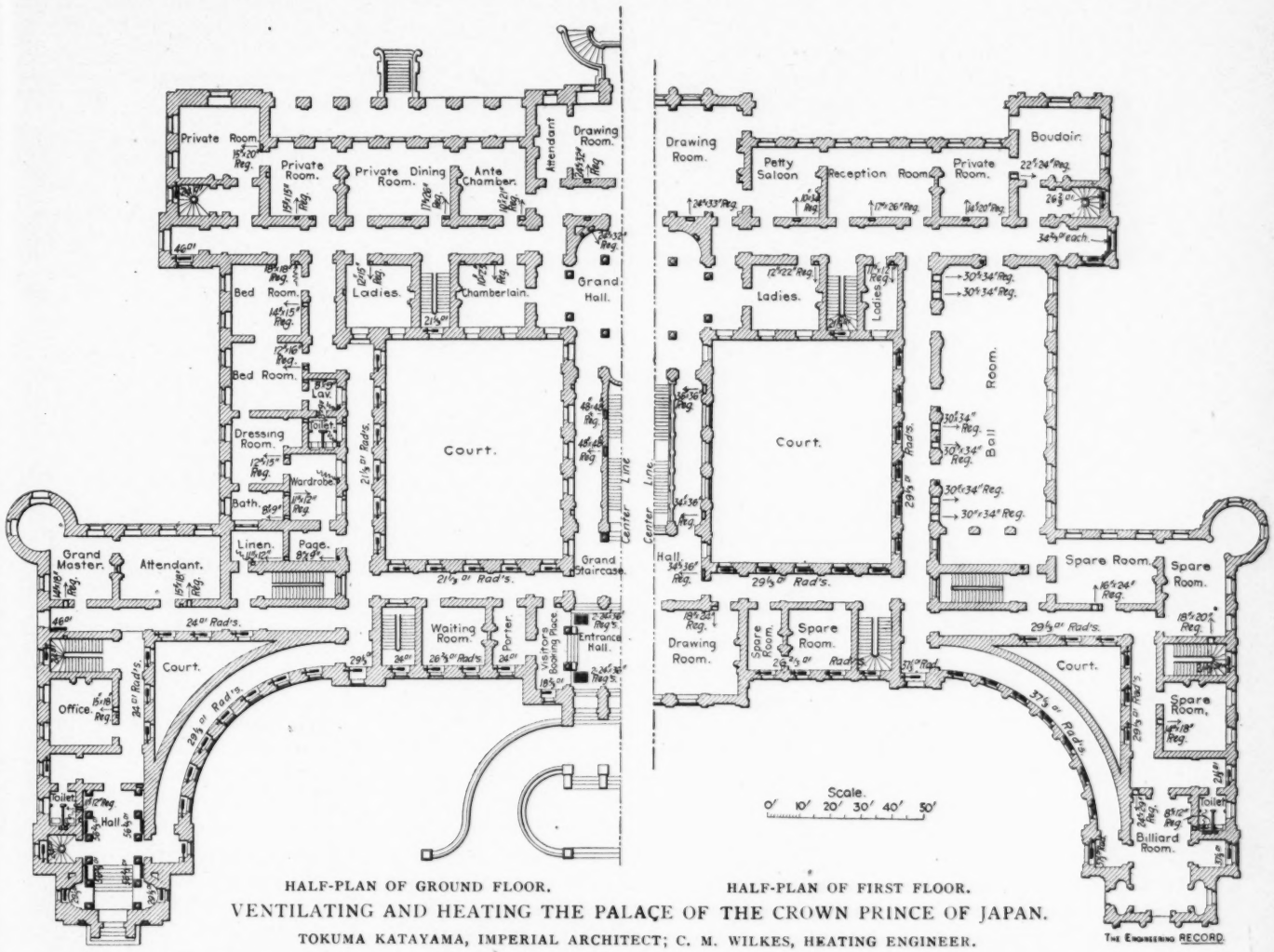
The double-duct sysytems, that is, the two ramifying from fans A and B, are practically identical. The fresh air for each is received through a 36x48-inch duct, both entering a room about 14 feet square, in which the cooling coils of the refrigerating apparatus are to be placed, as will be described further on. The coils have by-pass beneath, however, and the air passes on to the fans, passing through the tempering coils. These in each case comprise three sections, independently valved, with a total of 1,854 lineal feet of 1-inch pipe, offering 18.2 square feet free area for air flow. In each case the fan has a blast wheel of 66 inches diameter and 26 inches width at periphery, which is to run at a speed of about 300 revolutions per minute from a motor capable of developing 12.5 horse-power. Against a working pressure of 1 ounce, each fan is depended on to deliver about 20,000 cubic feet of air per minute. The heating coils immediately beyond the fan contain 1,062 feet of 1-inch pipe, arranged also in three sections. These have 10.6 square feet free area. It will thus be seen that the velocity through the inlet will be about 1,600 feet per minute, through the tempering coil about 1,100 feet per minute, and through the heating coil, on the basis of an increase in temperature over that out of doors of about 50 degrees Fahrenheit, about 2,000 feet per minute.



Part Plan of Basement Showing Piping Systems.

Each of these fans delivers to two ducts with a total area of 1,360 square inches, which gives an average duct velocity

under 40 feet per second. This system, in both cases, as explained, is a double-duct system; one pair of main ducts supplies all the front wing, and the other passes backward through the basement of the corresponding main part, continuing then toward the center of the building in the rear of the basement, a total distance for this main from the fan to the base of the farthest flue of about 150 feet. The ducts area in one case from 132 square inches to 792 square inches at the outlet, or a reduction in velocity of 83.3 per cent of that in the branch duct. When the state rooms are unoccupied, the ventilating apparatus connected with them can thus be shut down. The blowing unit marked C consists of a tempering coil of 1,194 feet of 1-inch pipe, with 10.2 square feet of free area, a fan with a 54-inch blast



HALF-PLAN OF GROUND FLOOR. HALF-PLAN OF FIRST FLOOR.

VENTILATING AND HEATING THE PALACE OF THE CROWN PRINCE OF JAPAN.

TOKUMA KATAYAMA, IMPERIAL ARCHITECT; C. M. WILKES, HEATING ENGINEER.

THE ENGINEERING RECORD.

in all cases, including the single-duct systems, are suspended from the ceiling, allowing piping to cross over them close to the ceiling; and at the branches, an air split or diverting damper is provided to regulate the flow in both main and branch. The tempered and hot-air received at each flue is mixed in an ordinary manner by dampers actuated by compressed air under thermostatic control, and the air enters the rooms with the register bottoms 7 feet above the floor. A section of a top of a flue is shown in an accompanying detail drawing, to indicate the use of air splits at those points, distributing the air discharge into the room over the whole register area.

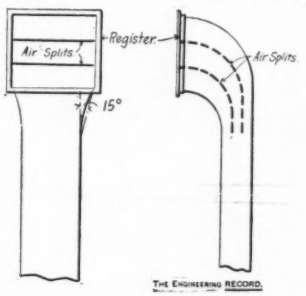
The two fan systems starting at the rear of the basement, C and D, in addition to supplying the large rooms of the second story, have also two basement outlets in each case, as shown. The trumpet-shaped terminal of these branch ducts is interesting, showing an increase in cross-section

wheel, 20¾ inches wide at periphery, and a heating coil of 744 feet of 1-inch pipe, with 6 square feet free area (this coil arranged in 4 sections). The fan is to be driven at about 300 revolutions per minute by a 7½-horse-power motor, and has a discharge capacity calculated on the same basis as that for fans A and B, of about 11,000 cubic feet per minute. The other blowing unit, D, is larger, consisting of a tempering coil of 1,929 lineal feet of pipe, a blower with 72-inch blast wheel and a heating coil of 1,190 feet of pipe. The free areas of the two coils are 19 and 12.2 square feet respectively. The fan wheel is to have a peripheral width of 26¼ inches and is to be driven at a normal speed of 200 revolutions by a 12-horse-power motor; the discharge capacity at this speed is calculated to average about 17,250 cubic feet per minute.

The remaining pair of fans supply the central part of the building, but the duct systems are not symmetrical. One

system supplies the rear of the central part of the building and the other, the main vestible and the corridor structure, on each side of which are the large courts. Both systems draw air from the courts. The rear system has a tempering coil of 1,392 lineal feet of pipe, with 14.8 square feet of free area, a 66-inch fan wheel 26 inches wide at periphery and a heating coil with 1,194 feet of pipe and 12.2 square feet free area. This fan is to be run at a normal speed of 150 revolutions per minute by a 5-horse-power motor and is calculated to deliver about 10,300 cubic feet per minute. The other system, F, includes tempering and heating coils of 1,704 and 1,062 lineal feet of pipe and 16.7 and 10.6 square feet free area respectively, and a fan with a blast wheel 72 inches in diameter and 30¼ inches wide. The delivery of this apparatus at about 150 revolutions is calculated to be about 14,000 cubic feet per minute. In both these systems, the air is discharged into the rooms at the floor line, the other systems, it will be remembered, delivering the air near the ceiling.

For the withdrawal of air from the building, practically no provision is made, the entire system being a plenum one and depending on the numerous paths of egress which there are in every building for the escape of air. There are, however, two fans at the roof to create a flow out through the various toilet rooms in the building, one for each main

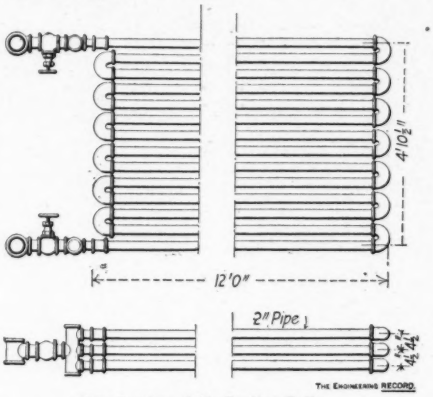


The Top of Warm Air Flues.

part. The air leaves the rooms through registers at the floor, passes upward directly in flues, which are connected in the attic by a system of ducts delivering the air to an exhaust chamber, the chamber for each half of the building being fed by its independent system of ducts. Each chamber is supplied by an 18x20-inch and an 18x18-inch duct, and the air is then taken by a centrifugal exhaust fan which discharges through an uptake 24 inches square, which extends a few feet above the roof, capped in an ordinary way. Both fans have 42-inch wheels, 16⅝ inches wide and are run at 240 revolutions per minute by 2-horse-power motors. Their discharge capacity is calculated to be about 2,500 cubic feet each per minute. The fan foundations in the attic are of wood bolted to the floor beams in a 2-inch insulation of hair felt to allay vibrations.

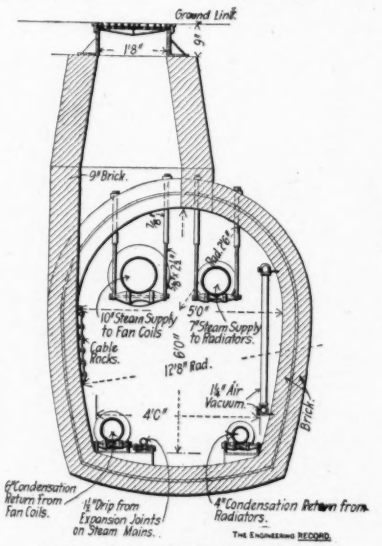
The third exhaust fan mentioned earlier in this description is located near one of these fans, and is to carry off the odors of the kitchen, inducing draft also for the kitchen ranges. It is the same size as the other two fans, but on account of the hot gases to be handled will have an overhung wheel provided with brass boxes. Both fan and motor will be enclosed in a housing of 6-inch tile. It will be run by a 2¾-horse-power motor at a normal speed of 180 revolutions per minute.

Owing to the great humidity of the atmosphere during the summer months, and especially during the rainy season, middle of June to middle of July, it is intended to maintain a relatively lower percentage of moisture in the air of the private apartments of the Crown Prince. To relieve the outside air of its great amount of moisture (which is as high as 90 per cent at a temperature of 100 degrees) before it is forced into these rooms, it is necessary to form a dew point at which the vapor of the atmosphere will be condensed. In order to form this dew point and partially condense the aqueous vapor a refrigerating apparatus is to be installed, as already mentioned.



One Section of Air Cooling Coils.

The refrigerating apparatus is of the compression type, installed in two sets, on account of the limited head-room and employing a brine circulation. Each compressor is driven by a motor, as indicated in the basement plan, and the machinery of each part of the apparatus is in a room 9 feet square in size, on opposite sides of the space under the main vestibule. In the latter are the cooling pipes, as already stated, which consist of 2-inch pipe coils, one sec-



Section of Tunnel from Boiler House.

tion of which is shown in an accompanying drawing. There are two coils in the room, cross-connected to each brine tank, and each section is supplied by a 3-inch pipe from a 4-inch main, with ten sections to each coil. As indicated in the detail, each section consists of 42 pipes over 11 feet long, thus presenting, including return bends, about 300

square feet of surface per section. Altogether there are thus 6,000 square feet of cooling surface in both coils. The platform supporting the coils is to be covered on top with a drip pan of galvanized iron, 2 inches deep, graded for draining. The water is to drain to a brick well in one corner of the room, 5 feet in diameter and 3 feet deep, with trapped overflow to sewer. As this water has a temperature of 45 degrees Fahrenheit and amounts to about 3,000 gallons in 24 hours, it is used to assist in cooling the condensing water.

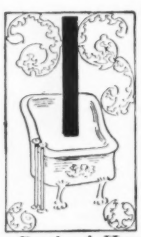
Each compressor is to have a 40-ton refrigerating power on a 24-hour rate and will have a displacement of about 168 cubic feet per minute at a piston speed not exceeding 140 feet per minute. As the condensing water is somewhat high in temperature and the air will be lowered to a temperature of about 40 degrees Fahrenheit, it is probable that methyl chloride will be used as the evaporating liquid instead of ammonia, as commonly used, an advantage ascribed to it being its less deleterious effects should a leak occur. The condensers will be of the submerged type, containing 3,400 lineal feet of 1¼-inch extra heavy wrought-iron pipe divided into six sections. The brine cooler in each room will have a capacity of about 36 tons. Each brine storage tank will be 6 feet in internal diameter and 8 feet high, of ¼-inch steel; these will be sunk in pits formed with brick walls, with tops flush with the basement floor. An 8x8-inch triplex belted electric pump, running at 50 revolutions per minute, will be used to circulate the brine. Each compressor will require a 48-horse-power motor; each pump a 3-horse-power motor.

The steam supply, as was stated, is received through a tunnel, shown in section herewith. The boiler house is 300 feet distant, and each supply and return main will be provided with a Wainwright expansion joint. The main for direct radiation is independent of that for the fan coils, both requiring large pipes; the distribution will be at low pressure, with the Paul system of relieving the radiators and coils of air. A 10-inch pipe supplies the fan coils and a 7-inch, the direct radiators. The layout is shown in a half plan of the basement, giving practically the whole of the fan-coil supply system and half of the latter, the direct system being symmetrical about the building axis, as far as pipe position and direction is concerned, but, of course, decreasing in pipe size with distance from the tunnel terminal. The direct radiation consists of 1¼-inch pipe coils suspended from the basement ceiling and direct radiators of the Verona pattern, 31 inches high including the legs, at all the windows in corridors above the basement, in all entrances except at the rear, which is the south side, and at all stairways, except those adjoining the main stairway. All radiation, except the ceiling and fan coils, are connected on the one-pipe system. Risers are anchored at the bottom. Each change of direction of main from horizontal to vertical has a drip, and condensation of the whole plant is returned by gravity to the boiler house. The direct radiation is controlled also by thermostats, one in each room, one in each stairwell, one in each entrance, and one for each group of radiators in the corridors. The piping from thermostats for the air is to be wire-wound lead pipe where concealed and brass pipe nickel-plated where exposed. The air tank for the system is to be 12 inches in diameter and 60 inches long.

The specifications for pipe covering require that steam pipes be covered with an air-cell asbestos sectional covering containing at least 93 per cent asbestos, the average fiber of which must not be less than ¾-inch in length. The finished covering is to weigh not more than 11 pounds to the cubic foot and most show a saving of 90 per cent of the heat lost per square foot of uncovered pipe surface, the temperature of the atmosphere being taken at 60 degrees Fahrenheit and the temperature of the inside of the pipe being that corresponding to a steam pressure of 150 pounds per square inch. The warm air ducts are to be covered with 1 inch of hair felt, all covering wrapped in the usual way in canvass and painted. The exposed piping in connection with the refrigerating machinery, except, of course, the cooling coils, will be enclosed by Glacial covering, to a thickness of 1¼ inches, laid in two shells. The brine tanks rest on an insulation consisting of alternate layers impervious and insulating felt, laid on a hardwood flooring 6 inches thick.

The heating and ventilating work was designed by Mr. C. M. Wilkes, of Chicago, in consultation with Mr. Tokuma Katayama, the Japanese Imperial architect.

International Acetylene Association Annual Convention at Buffalo, N. Y., June 20-22, 1901.



IN the large, light and airy hall of the Ohio State Building on the Pan-American Exposition grounds, President Herman, of Buffalo, opened the International Acetylene Association's annual convention shortly before noon on Thursday, June 20, with the following gentlemen present:

Raphael Herman, Pan-American Acetylene Co., Buffalo.

J. B. Carroll, "Hahn" Acetylene Gas Burner, Chicago.

Geo. Landis Wilson, F. Cortez Wilson & Co., Chicago.

Chas. E. Ummach, R. Williamson & Co., Chicago.

W. W. Turner, Abner Acetylene Gas Co., Chicago.

A. H. Gehle, Eseman, Gehle & Co., Chicago.

H. E. Shaffer, American Acetylene Burner Co., Rochester, N. Y.

Walter A. Wood, Jr., American Acetylene Burner Co., Hoosick Falls, N. Y.

R. Stewart, State Line Mfg. Co., Chattanooga, Tenn.

W. E. Scofield, Sunlight Gas Machine Co., New York.

W. C. Pratt, Bruce-Cram Generator, New York.

L. J. Wing, L. J. Wing Mfg. Co., New York.

Emory S. Turner, 45 Broadway, New York.

W. H. Drake, Drake Acetylene Apparatus Co., Cleveland, Ohio.

John A. Burgess, Burgess Gas Process Co., Toronto, Can.

C. A. Graham, Burgess Gas Process Co., Toronto, Can.

F. M. Draper, Draper Mfg. & Gas Co., Dana, Ind.

W. M. Taylor, Draper Mfg. & Gas Co., Dana, Ind.

John J. Graf, Union Light & Heat Co., Cincinnati.

Edward T. Titus, "Perfection."

Walter B. Clay, The Acetylene Co., Washington, D. C.

Robert Exley, Providence, R. I.

Harvey T. Hauer, Lebanon Fuel Illuminating & Power Co., Lebanon, Pa.

J. M. Morehead, Union Carbide Co., New York and Chicago.

H. A. Brognard, Electro Lamp Co., Niagara Falls.

H. H. Roberts, The Metal Worker, Chicago.

H. H. Southworth, Plumbers' Trade Journal, Chicago.

Chauncey L. Williams, Engineering Review, Chicago.

Elmer Crawford, Domestic Engineering, New York.

Frank P. Turner, Domestic Engineering, New York.

After the appointment of several committees a recess was taken, the convention assembling again at 2:15 p. m. President Herman suggested that, as there were some present who were outside of the association, who had expressed a desire to become members, all such make application at once. A motion was made, seconded and carried that the roll of membership be called, and this was done accordingly. George Landis Wilson, of Chicago, was then called to the floor, and held the rapt attention of his hearers during the reading of his excellent paper on "The Future of Acetylene Lighting." Mr. Wilson's essay elicited hearty applause, and a vote of thanks was extended to him by unanimous accord. President Herman then read his annual address, which was received with approval. Upon motion a vote of thanks was extended to the Pan-American Exposition management for the prominence given the acetylene industry through the erection of the Acetylene Building, and for many courtesies shown, and thanks were also voted the Ohio Commissioners for the use of their state building. Secretary-Treasurer Carroll submitted his annual report, which was approved and adopted as read.

REPORT OF SECRETARY-TREASURER.

The report of J. B. Carroll, secretary and treasurer, shows total resources on hand, June 15th, to be $273.27. The membership of the association shows a heavy increase and the prospects are most flattering for the continuance of same. The literature received from every quarter of the United States shows that the character of acetylene apparatus now being placed on the market has been greatly improved and firms and companies of unquestionable financial standing are gradually entering into the manufacture of these products.

A proposition was made to have a photograph taken of the Acetylene Building with the members of the association and their friends grouped in front. The point was made that it would be practically impossible to make a picture that would do justice to the building and at the same time present recognizable likenesses of the individuals in the group. After some discussion Mr. Morehead proposed a happy solution to the problem by moving that two pictures be taken, one of the building and the members, and one of the members and the building.

George W. Kuchler, of the Roessler & Hasslacher Co., of New York, presented an interesting paper on the "Purification of Acetylene Gas," which created considerable comment and discussion of the subject.

An interesting discussion followed on purifiers in general, in the course of which Mr. Morehead, of the Union Carbide Co., gave an instructive talk in which he mentioned phosphorus, sulphur and ammonia as the principal elements to be eliminated by chemical purifiers.

President Herman vacated the platform to take part in the debate on the floor, and H. E. Shaffer acted as temporary chairman. An adjournment was had at 5 o'clock and the delegates, visitors, members of the press, etc., proceeded to the Acetylene Building, where two photos were taken, one of the group massed in front, and one of the building complete with its immediate surroundings.

SECOND DAY.

The convention reassembled at 10:30 o'clock Friday morning.

The convention then proceeded to the election of officers. Nominations were made by ballot, the two receiving the largest number of votes being declared the nominees. George Landis Wilson and J. B. Carroll were selected as candidates for president, and a further ballot resulted in the election of Mr. Wilson, which was made unanimous amid warm applause.

H. E. Shaffer and R. Herman were declared nominees for vice-president. Mr. Herman gracefully withdrew and Mr.

Shaffer was unanimously elected. Mr. Wilson moved that the rules be suspended and J. B. Carroll declared unanimously re-elected as secretary and treasurer by a rising vote, which was done.

Next in order was the election of officers for the ensuing year. Ex-President Raphael Herman was named by acclamation for the two-year term, the remaining directorship being filled by the selection of Messrs. Ummach, Wing and Drake. The complete list of the new officers is as follows:

President, George Landis Wilson, Chicago.

Vice-President, H. E. Shaffer, Rochester.

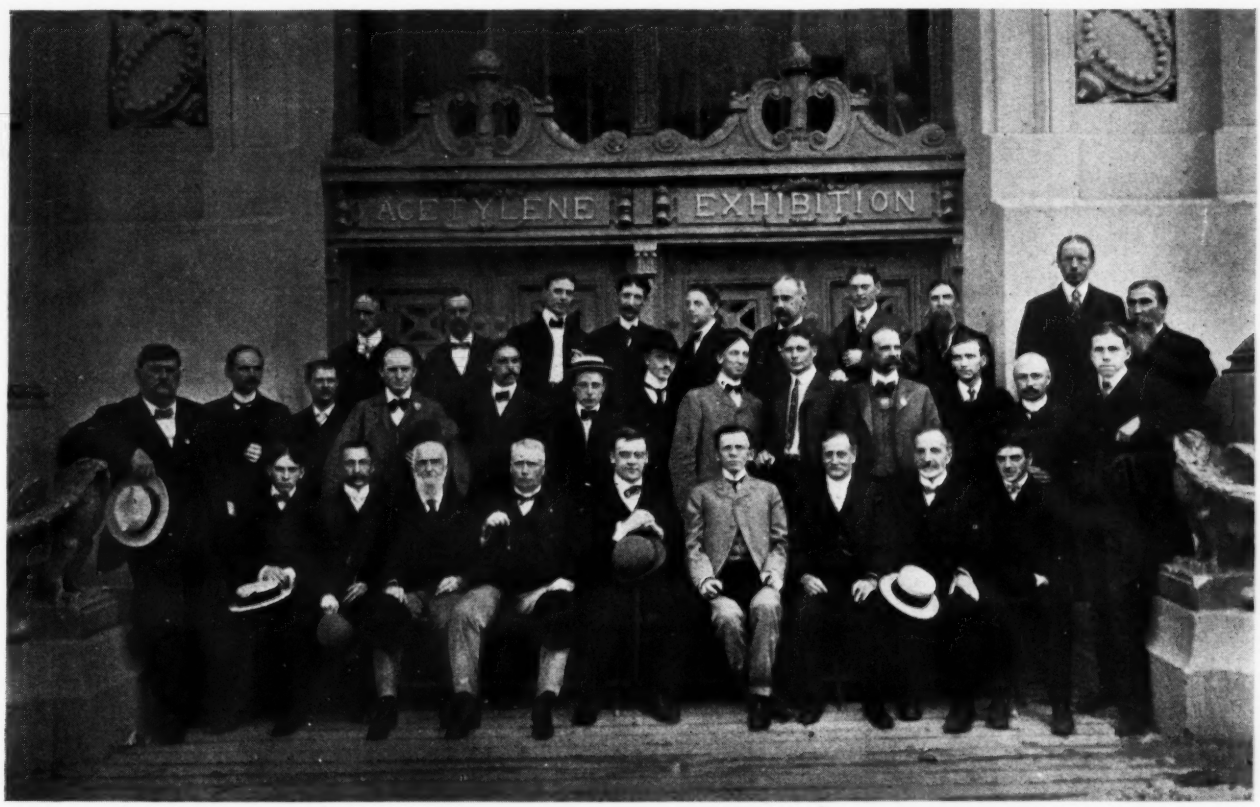
Secretary and treasurer, J. B. Carroll, Chicago.

guarantees more cubic feet per pound than any of the others and prices range from $5.00 to $20.00 per ton less.

The Union Carbide Company controls its right to manufacture by over one hundred patents and is bending every energy to produce carbide so cheaply that it will be attractive to the consumer. From July 1st calcium carbide will be furnished at $70.00 a ton, which makes the light produced cheaper than anything on the market. Limestone and coke, the principal ingredients of acetylene, are in great abundance and the price will still be reduced as all other forms of ordinary lighting depend upon some product of the oil wells, and there is little chance in improvement in these cases. In the case of petroleum products we are drawing upon the stores of former geologi-

Resolved, That it is the sense of this association assembled in annual meeting that to serve the best interests of the acetylene industry it will be desirable in cases of dispute on patent litigation to limit all suits to persons in the trade, carefully avoiding the unsettling possibilities of annoyance to the relatively small consumer upon whose good will and good word we depend for the extension of our business.

Resolved, That it is desirable to limit statements of cost in advertising to a wording substantially as follows: The cost for the half-foot burner generally used is somewhat less than one-half cent per hour. Such a burner will give excellent illumination over 100 square feet, with ceiling 14 feet high. The diffusive quality of acetylene makes comparisons



Directors: Raphael Herman, Buffalo; L. J. Wing, New York; W. H. Drake, Cleveland; Chas. E. Ummach, Chicago.

By request of the chair Walter A. Wood read the report of Wm. Finkler, chairman of the committee on carbide.

Report of Committee On Carbide.

Calcium carbide was discovered May 4, 1892. Prior to that time it was theoretically buffeted about in chemical laboratories and for three years after its discovery it sold for $1.00 per pound and that in an impure state. In 1895 a large company was formed to exploit it and the price dropped to 4 cents a pound and it is now manufactured in large quantities at Niagara Falls and Sault Ste. Marie. Now there are four large producers of carbide. A company in Canada, one in England, a combination of companies on the continent of Europe and the Union Carbide Company, besides 42 more houses in the United States from which calcium carbide is shipped in carload lots in a state of chemical purity, crushed to any size or kind of packages desired. The United States product

cal ages which are fast being exhausted, and it stands to reason prices will not be reduced to compete with acetylene. And when all the sciences are most effectually applied to the production of acetylene the price of same will diminish in a more startling ratio than others increase.

The report was accepted and ordered printed and a vote of thanks was extended the authors.

Mr. Morehead then read an interesting and exhaustive paper on Acetylene for Car Lighting, which was accepted with thanks.

Mr. Wilson, chairman of the committee on resolutions submitted the following report:

Resolutions.

Resolved, That all burners should be properly tested, and all boxes used for shipment of burners should be properly labeled with the size, and a guarantee that each burner is tested and marked with its actual hourly consumption under a pressure of twenty-five tenths.

of actual candle power difficult, as they do not give a proper understanding of its value.

Resolved, That as an association we unhesitatingly record our belief, based upon careful judgment and experience, that the use of portable lamps and similar devices may, and should be, permitted in the Acetylene Building at the Pan-American Exposition, subject to the inspection and approval of the other exhibitors in said building, or of such a committee, of not less than three persons as they may select. We respectfully urge upon the underwriters the reasonableness and urgency of this request that such permission be granted, and that a committee of three be appointed to wait upon the proper authorities.

Resolved, That the president appoint a committee of five to consider and report a plan for the extension of the scope and membership of this association at the next general meeting.

Mr. Steward, of Chattanooga, presented the report of the committee on carriage, automobile, bicycle and table lamps, of

port a plan for the extension of the scope and membership of this association at the next general meeting.

Mr. Steward, of Chattanooga, presented the report of the committee on carriage, beauties of acetylene gas to a vast number of people by the medium of bicycle, carriage, automobile and table lamps, therefore, be it

RESOLVED, That we express our appreciation of the efforts of the manufacturers of such articles and assure them of our hearty support in the introduction of all such articles of merit.

Respectfully submitted.

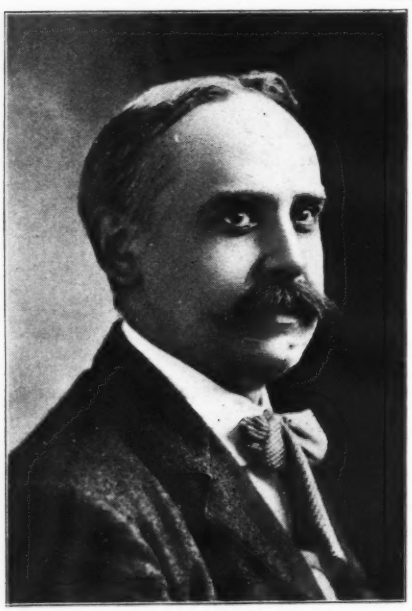
R. B. Steward, Ch.
E. T. Titus.
Chas. E. Ummach.

Attention was next given to the report of the legal committee.

REPORT OF LEGAL COMMITTEE.

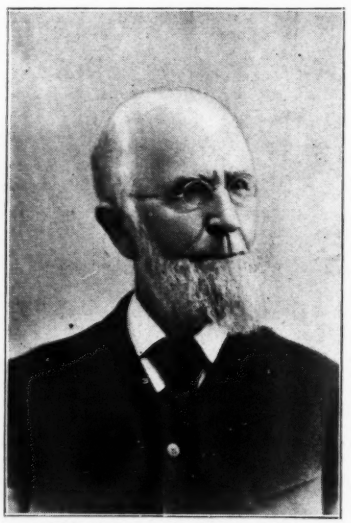
Only one suit among generator manufacturers was reported and the committee is informed that the same has been dismissed. Two suits among the burner manufacturers, namely, Schwarz vs. Shaffer, and Shaffer vs. Schwarz. The committee does not believe in converting the association into a legal defense society. Each cause must stand upon its own merits. The association to be an aggressive and defensive body for the promotion of interests of the entire trade and not for specific purposes. They recommend that all suits growing out of patents be limitetd to the trade and not be extended to the consumer, thereby unsettling the good done by the association as a whole.

A. J. Murdock, M. D., of Minneapolis, read a paper on acetylene stoves and their appliances. He referred to the belief among many that the use of acetylene gas for cooking purposes is at best impractible and described the two years of experiment and effort on the part of the American Acetylene Stove Co., of



GEORGE LANDIS WILSON, Chicago.

which he is secretary, to solve the problem of producing a burner for that use that would be safe, effective and reliable. This they claim to have accomplished with their "Alpha" cooker. The burner is constructed of perforated steel, with outer and inner walls, with coarser perforations in the inner than in the outer wall, and intended to supply the top of the burner only; at the bottom of the cylinder there is a concave surface or distributor; there is a mixing chamber, a draft stack, a feed tip, the latter so located in the stack as to partially mix the gas with air before reaching the burner. The secret of perfect combustion of acetylene gas, he says, consists in adding the proper proportion of air before reaching the burner, the breaking up of the carbon by passing it through minute perforations in the burner surface by a certain number of square inches of burner surface to each foot of gas consumed. By increasing the burner surface and supplying sufficient gas, properly mixed with air, one may obtain almost any degree of heat desired, up to a certain limit. The desired end is to secure the greatest amount of heat from the least amount of gas and it is claimed that the "Alpha" meets this requirement.



H. E. SHAFFER, Rochester, N. Y.

The point is made that where a dealer carries cookers, the stove will very often sell the generator.

It was after one o'clock when a recess was taken for lunch, but by 2:30 all were in their seats and close attention was given the reading by Mr. Wilson of a paper by McDonald Elliott, of Santa Rosa, Cal., entitled, "Acetylene As Applied to Locomotive Headlights." This was followed by an essay on "Results of Practical Experiments with High Pressure Lighting," read by the author, Harvey T. Hauer, of the Lebanon Fuel, Illuminating & Power Co., of Lebanon, Pa.

The last paper of the day, one that held the interest of the convention for some time, was on "Town Lighting," by Col. Emory S. Turner, of New York. Col. Turner stated that he would be glad to answer any questions on the subject, and an animated debate ensued which lasted for some time.

The subject of burner pressure was again brought up and the following amended resolution was passed:

Resolved, That in the interest of the entire industry this association should use every effort to encourage and establish the general use of a burner pressure of at least 25-10 inches water column in all permanent installations of acetylene gas for lighting purposes.

It is also recommended that a card of instruction be attached to each generator installed, stating that the apparatus should be operated at all times under a pressure of 25-10 inches, in order to obtain correct results in the consumption of gas which passes through burners which are rated at this pressure. The detail business of the convention being finished, the association adjourned sine die, meetings to be held in Chicago from time to time at the call of the president.

The crowning event of the meeting was the banquet on Friday evening at the elegant rooms of the Ellicott Club, which occupy the greater part of the tenth floor of the great Ellicott Square Building. The collation was all that could be desired, and the occasion was one of uninterrupted enjoyment. Toast followed toast and the scintillations of repartee vied with the sparkle of the champagne.

On Saturday morning the delegates assembled at the corner of Main and Niagara streets and boarded a special trolley car for an excursion to Niagara Falls, which was enjoyed to the utmost by all.

Comments on the Acetylene Building.

As a general rule there is a certain amount of sameness about all expositions, whether they be local, or of an international character, as coming at such short intervals apart, there is not a great increase in new inventions. This, however, is not the case at the Pan-American Exposition. There is one strictly new and original thing, and that is the system of lighting by acetylene gas. At the time of the World's Fair, calcium carbide, from which the gas is made, was purely a theoretical property known only to a few chemists who came across it in the course of their laboratory experiments.

In the year 1893, the commercial method of manufacturing calcium carbide was discovered by Prof. Thos. L. Willson, but it was not until 1896 that the first works for manufacturing calcium carbide were in active operation, and the commercial article placed upon sale.

In the history of invention there does not appear to be any industry that has made the rapid strides that has acetylene, and the showing made at the Pan-American Exposition is certainly one of the attractions, if not the greatest attraction on the grounds. A special building has been erected for the display of machinery for the manufacture of calcium carbide and for the display of different forms of apparatus for generating the gas. The illumination of the outside of the building is certainly a picture. The bright white light of acetylene shows in marked contrast to the electric lights, the latter appearing decidedly yellow, and of considerably lower candle power.

The Acetylene Building is located on the Mall, at the corner of the Midway, and as that portion of the grounds is the redezvous for night visitors, it is needless to say that the lighting of the Acetylene Building attracts more attention and exclamations from the crowd than any of the other buildings in the vicinity.

The interior decorations of the building, while conforming to the general color scheme, are much more beautiful than those of any of the other buildings, the scheme being old rose, white and gold. After inspecting the outside of the building, which is ablaze with light, upon entering the door one sees a sight which will never be forgotten. The general interior lighting scheme of the building is in the form of arches about 12 ft. high. On each arch there are 10 50-c. p. acetylene jets enclosed in prismatic globes. The arches are all enameled white. Suspended from the ceiling are seven specially made wrought-iron chandeliers, each contain-

ing 12 50-c. p. lights, and the contrast of these fixtures with the surroundings is a marked one. Many types of generators are shown, but by far the most attractive exhibit is that of J. B. Colt Company, of New York, with branch houses at Boston, Philadelphia and Chicago. They occupy 500 square feet of floor space, the space taking up the entire platform between the two main entrances. At the extreme eastern end of their space is their office, which is elaborately furnished with the best of oak furniture, the rug covering the floor of same, being in perfect harmony with the general color scheme, is old rose and dark maroon. At the head of the aisle is the enterance to their space, and on either side of same are two model acetylene lighthouses. These throw revolving lights, or flashes. The one throws a white flash, the other, one red and two white flashes. In looking at these lighthouses one is impressed with the radical changes in their construction over the ordinary form of lighthouse which is now in use. The present form of lighthouse uses oil as a radiant. They are expensive to build because of the fact that all the heavy machinery is at the top of the lighthouse. The lighthouse keeper is compelled to carry his oil up a spiral staircase, and it is an absolute necessity for one man to be on guard in the tower continuously to see that the lights burn. In the acetylene lighthouses which the Colt company are showing, the light is thrown from the base. It is not necessary for the keeper to climb the stairs to watch his light. The flashing at the top is accomplished by revolving mirrors or reflectors which are operated by electric motors. These motors and reflectors in the regular size lighthouses would not weigh over 200 or 300 pounds, while in the present form of lighthouse the lenses and mechanism for revolving same weigh from 2 to 3 tons.

Acetylene Building at Pan-American Exposition.

By practical means the Colt company have demonstrated that acetylene gas is undoubtedly the illuminant for lighthouse purposes, and the United States government is investigating the merits of their apparatus. Acetylene gas has already been adopted by the United States Signal Corps and Medical Departments, and the Colt company are showing in another part of the grounds a portable outfit for lighting a field hospital camp.

At the rear of their space they have in operation an automatic machine for supplying from 1 to 1,000 25-c. p. lights. All the lights shown on their space are run from this plant, and, considering the large capacity of this machine, it is really quite a small apparatus. It attracts a great deal of attention, as visitors can see the machine in operation, and are not merely told of its action through the medium of circulars.

On the western portion of the space are shown all the different types and sizes of acetylene generators which this company manufactures. These types embrace all the numbers of generators from the old style of dripping the water on the carbide up to the new type of feeding a small charge of carbide into a large volume of water. On this portion of the space is also a working table upon which is shown a small model of the carbide feed machine which is constructed of glass, so that the visitor can see the manner in which the carbide is fed to the water, see the gas generated and the result obtained by burners being in operation coupled direct with this working model. It is an interesting operation to watch the attendant clean and re-charge the large 1,000-light plant, and by actual demonstration it required only about as much time to clean and refill this machine as a person would ordinarily consume in cleaning and filling one kerosene oil lamp. The residuum is drawn off through a sewer, running water is admitted into the machine, and the operation is so simple that anyone can attend to the apparatus. Aside from the apparatus shown, which includes not only their large line of acetylene apparatuses, but a general line of the stereopticon goods, this company is also considered the leaders in this line as well as large manufacturers in the acetylene line. In both branches of their business they are said to be the pioneers. They claim that until they manufactured stereopticons which were not toys, the only ones that were offered in this country were of foreign manufacture. It was through the stereopticon branch that they took up the acetylene business. They first experimented with the use of acetylene gas as a radiant for the magic lantern, or stereopticon, and when they demonstrated to their own satisfaction the beauty of the light, they commenced immediately to perfect the apparatus to automatically generate this gas, which apparatus could be installed for general illuminating purposes. They were really the pioneers in the acetylene business, and have been constantly on the alert employing the best engineers that the country can offer, and are continually bringing out new appliances for the use of acetylene goods. Among other things they are showing, are heating devices, Bunsen burners, outfits for dentists and surgeons, for contractors' use, dock lights, small searchlights for naptha launches and other small craft, photo engravers lamps, apparatus for the enlargement of photographs, etc. Altogether the exhibit they are making is more than creditable. It is the handsomest exhibit in the acetylene building, and it is the opinion of many that there are none on the grounds any superior. They make a liberal use of their trademark, the word "Colt". This sign appears in the arches surrounding the space. The machines are all white enamel with dark red and gold trimmings. In the rear, the space is finished of carved wood, and in the doors of the four closets in same are heavy bevelled plate glass mirrors. The exhibit was designed and constructed by Mr. J. E. McKee, the manager of their southern department, who is in charge, and he states that in all his experience, he has never seen the amount of interest in acetylene that is being taken at the Pan-American. Since the space has been open, they have booked many orders.

Purification of Acetylene Gas

(Paper read before the Acetylene Convention at Buffalo, June 22, 1901, by George W. Kuchler, of New York.)

One of the questions most vitally interesting to the acetylene lighting business at this stage is the smooth working of everything connected with the generation and consumption of the gas. We have to compete against old established industries, be they oil, coal gas, or electricity, who have for many years battled against each other and, by the introduction of one convenience, one economy, one simplification, after the other, have striven to attract the light user to themselves.

We must make their experience our own and not expect the consumer, simply on account of a brighter light, to take a backward step of 20 or 30 years and with the installation of an acetylene generator resume the contest against annoyance as of yore. If we want the public to become quickly interested in acetylene light, we must furnish it with machines which give no trouble, with burners that will give the right kind of light, with gas that is pure and will not stop up the burners. Neither should we ask them to put up with a particularly nauseous odor, far worse than the stench emanating from the old oil lamp, horrible if compared with the smell of coal gas, and, of course, the most undesirable possible drawback in competition with the electric light. Will anyone in his senses deliberately throw out his incandescent lamps, which are taken care of absolutely by the Central Station, which he turns on without the use of a match, which do not impoverish or vitiate the air in his rooms, and instead install a light which is better as to light giving power, but which lacks all the other conveniences?

How, then, can we put ourselves on an equal footing with our competitors and, in making a bid for the trade of the consumer, how can we let all the advantages of acetylene gas speak for themselves without being forced to apologize for its faults?

I dare not guess how often just these faults have operated to lose business which rightfully belonged to acetylene gas. The problem is extremely simple now that eminent chemists have laid bare the impurities existing in all commercially prepared acetylene gas.

We have first to take care that the gas is produced without over-heating. We know that the heat produced at the point of contact of the carbide with the water is so intense that, unless instantly dissipated and cooled, the gas is decomposed (polymerized, as the technical fellows say), which greatly diminishes its light giving power. But the properly produced gas still has ingredients which should be gotten rid of. It is always mixed with ammonia, but if we wash the gas or let it bubble up through a large quantity of water after generation the ammonia, as well as all dust particles, are retained and prevented from getting into the pipes and burners.

We all know that aromatic (?) smell of acetylene gas than which I believe there is none worse or more offensive to the nostrils of the uninitiated. Gradually one may become used to it just as there are thousands of people working with love at the making of Limburger cheese in the dog-days. But there is no need of forcing consumers to accustom themselves to an odor, which, coming from any other source, would result in a hurry-call to the plumber or to the board of health. Our friends, the chemists, tell us that that terrible smell is due to the presence of phosphuretted nitrogen and sulphuretted hydrogen. The former is so dangerous and self-inflammable a compound that I dare not show it around, but the latter is in this little bottle and anyone desiring a whiff can have it free of charge and welcome to it. The resemblance of the odor to that of acetylene will at once be recognized.

Aside from the obnoxious smell these impurities, and particularly the phosphuretted hydrogen, have another very annoying effect in the consumption of the gas. As stated before this compound is self-inflammable and, therefore, as soon as it issues from the burner and before it has reached the light zone, it burns and by its heat decomposes the acetylene, which then deposits solid particles at the burner orifices, thus gradually clogging them.

This, then, appears to be the real reason for the stopping up of the burners, necessitating frequent cleaning of the same; which bother, if we can prevent it, we should not inflict on our customers. Aside from the fact that many burners are hard to clean or may be in inaccessible places, as, for instance, near a high ceiling, the very idea of putting trouble on the consumer with which he is not burdened when using coal gas or electricity, should decide us in favor of a preventative.

Now for the remedy.

In Europe, where the government, the state authorities, the provincial and city officials, together with the insurance companies, take a very fatherly interest in acetylene lighting, each making its own rules and laws, generator manufacturers have long ago been forced to provide a method of purification. As a consequence, many systems have sprung up and the one that leads them all must indeed be good. Some are cumbersome, others are expensive, more require constant attention from the gas user, still others deteriorate the gas.

Prof. Lunge and other eminent authorities have designated chloride of lime as the ideal purifying agent for acetylene gas, provided it could be put into a state admitting at once intimate contact with the gas and easy passage of the same. But the plain chloride of lime did not possess these qualifications, and it was, therefore, only the discovery of an ingenious process of manufacture which, in conjunction with other substances, produced that chemical in highly porous lumps which made that purifying material for which the want had been so long felt practically available to the acetylene industry. This material, which for the past two years has fought its way to the top in Europe, is called Puratylene and is now also produced under license in this country.

Permit me to say a few more words about this interesting compound, its action, properties and application.

This chemical, binding as it does all phosphuretted and sulphuretted hydrogen, acetylene gas after passage through it has lost its ill-smelling properties, and, instead, has an agreeable ether-like odor which, however, is strong enough to be readily noticed. As soon as the Puratylene is exhausted the garlic smell reappears.

The absence of phosphuretted hydrogen prevents the burners becoming obstructed; no phosphor compounds can poison the air; self-inflammation of the gas is excluded. The gas moreover is thoroughly dried and therefore freezing of the house-pipes will not occur.

Two seasons' use of this purifying agent in many isolated and city plants has demonstrated its practical utility and also its very cheap application. It has been found that on the average one pound of Puratylene will serve 500 cubic feet of gas or, in other words, the average household can have its gas purified for less than $1.00 per year, figuring 3 lights for 3 hours per day all the year around. For large installations this method works still more economically.

The vessels containing the chemical are generally proportioned so that they need refilling but two or three times a year depending directly on the consumption of gas. It does not decompose in its container without doing its work. To do it thoroughly well its bulk should be of definite dimensions as to diameter and height, and the current of gas should enter the purifying vessel at the top and issue into the house or service-pipes from the bottom, thus insuring an equable exhaustion of the entire mass, as also preventing a caking of the chemical through unequal absorption of moisture. The slight resistance to the passage of gas interposed by the purifier is readily overcome through a small increase of pressure at the gas-holder.

I am convinced that Puratylene needs but a fair trial by the apparatus builder, by the supply-jobber and by the consumer to gain their love at first sight. That sight can be had by a visit to the live exhibit in Section "G" in the Acetylene Building, and by an inspection at night of the Ohio State Building, where the 700 burners are fed with Puratylene purified gas.

Future of Acetylene Lighting

By George Landis Wilson, Chicago
(Copyrighted 1901)

"The best of prophets of the future is the past." So wrote Byron over eighty years ago. Others had expressed the same thought, and it has been well stated since, but the truth of the aphorism is more generally accepted today than ever before, and so it should not seem amiss if this discussion, in part, deals with ancient history.

Whatever may be said, the discriminating must note a paradox in the lighting industry. A new means of illumination serves to supplement or extend rather than destroy existing methods. Candles continue to be in large demand, even in cities with gas plants. Kerosene holds its own, and the use of electricity, particularly in arc lamps, has compelled neighboring shopkeepers to extend their lighting facilities and burn more of the old illuminants if they continue in the race for trade. Acetylene, by providing true, steady light, will compel the improvement of old methods, but cannot compass their downfall or abandonment. Even the daylight bringing prism window will bring about a demand for the proper artificial illumination of gloomy interiors where the light of day can never be directed. The same spirit extends to the home, factory and church—good, better, best, are relative terms, not absolute. The ideal is usually the unattainable, but every acetylene light placed in general use is a little step toward the millennium.

The field for acetylene is practically unlimited, and every day points the way to new spots that need but little cultivation to produce an abundant harvest in due season. For many years, perhaps always, the perfect conditions for the installation of acetylene apparatus will be found in isolated localities. With efficient, permitted generators large enough to light a small house sold at twenty-seven dollars each "to the consumer," there are few farmers in the United States who cannot afford acetylene. Many of them will have it before many years elapse. The country storekeepers have been and are experimenting with various makeshifts, but this only proves that they are keenly alive to their need of better light, and those who are wise know that there can be no rest from this feverish search until they come into the acetylene fold. For many years acetylene must serve as the buffer between the dissatisfied user of gas or electricity from a central station and the more or less satisfied corporation striving to earn dividends. There will usually be little or no profit in this business, but there is often great glory. An exception may be made of those small towns where the autocrat in charge of the electric light plant runs his establishment according to rules and the calendar, ignoring the needs of his patrons. The inconvenience and loss in store or factory which result from the absence of electric lights (however excellent at night) on dark days and early evenings, as well as the annoyance in the home or entertainment hall which is deprived of current at an arbitrary hour each night, will become unpleasant memories when the rebellious victim rises in his wrath and installs acetylene, always ready to do his bidding.

Discriminating manufacturers and progressive merchants will come to realize that in many industrial operations and for displaying a large variety of goods the acetylene light is really indispensable. Electricity and mantels both

fail to accomplish the wonderful results that follow the intelligent, expert application of this new, scarcely known servant.

The city home of luxury, hung with rich curtains and tapestries, adorned with frescoes or masterpieces of art, furnished with soft upholstery and rugs, offers an excellent opening for acetylene. Inquiry among owners develops the fact that the products of combustion from common gas often produce disastrous results in the destruction of these beautiful interiors. As a rule, the refuge of such a householder is electric light, which as usually furnished is utterly unfit for use as a reading or working light in the home. These men need light, can afford to pay for it, and when they appreciate the situation will have acetylene.

Students and elderly people whose eyes are impaired by long straining under dim or unsteady lights make up another class of future users of acetylene, whether in or out of town. In many instances a small generator furnishing a few lights for a special purpose will be the forerunner of a complete surrender by its devotees—won over by a rare combination of beauty and utility.

Apart from the lighting of ordinary interiors, special applications of acetylene will cut no small figure in its introduction to general use. The phenomenal diffusive quality of this light will cause it to be adopted in every compactly arranged enterprising village as the only illuminant for streets and other public purposes.

Experiments now complete have proven the usefulness of acetylene for lighthouses, range lights and beacons, for which it is admirably adapted, not only on account of the penetrating qualities of the light, but also because it is feasible to maintain lights at points difficult of access by making monthly visits at opportune times, avoiding the daily attendance which too often involves loss of life and interruption of the service. Akin to this is the application of acetylene to searchlights and signals, which will reduce the perils of navigation on inland as well as salt water. On land, too, such lights have their place, and will be applied to advertising, display and show purposes as soon as opportunity is given to prove their effectiveness. The acetylene stereopticon has become an every-day article of sale, and the day may not be far off when moving pictures will be projected with the new light.

The actinic value of acetylene very early commended it to the use of photographers, who as they come to fully understand and appreciate how useful it really is will follow their more progressive brethren and adopt it. There is no light so good for enlargements and some classes of commercial work, still its application in this direction has scarcely commenced.

Owing to its accuracy the acetylene light lends itself readily to examinations by physicians, surgeons, dentists and other professional men. Whatever lights may be in common use, the future will find every complete operating room equipped with acetylene. It will be found especially desirable in hospitals where emergency work is certain to demand instant attention sometimes at hours most inopportune. If an acetylene generator is used, the wires will never be down nor a fuse burned out, the engineer will not be off nor the mantels or glassware broken, but the little lighting plant entire may be placed completely under the control of those in the operating room, ready for immediate service.

In horticulture and similar pursuits acetylene light will be utilized experimentally and commercially in forcing.

Railroad men who are up to date in their desire to reduce the hazards of operation to a minimum stand ready to give the engineers on night runs every appliance which will tend to do away with collisions and other mishaps. Not the least of these is good light, and acetylene in a proper device is demonstrated to be the very best illuminant in a headlight. Its steadiness, cheapness, simplicity, reliability, durability and great power, free from all the drawbacks that attend the use of other intense lights, will crowd it rapidly to the front and make acetylene the only acceptable headlight for modern railway operation. Familiarity with acetylene on engines in the operating and mechanical departments of our great railway systems will make its adoption in coaches a matter of course. Eight or ten burners each consuming a maximum of three-quarters of a foot of gas per hour, are represented to light a car satisfactorily for many roads. As used in most of the all-night service, these jets represent a consumption of about sixty feet of acetylene, which cannot possibly cost more than sixty cents under the most unfavorable circumstances, or forty-two cents under the best. One hundred and eighty feet of Pintsch gas required for the same service, at $5 per thousand, costs 90 cents, which in the case of companies operating their own gas works is reduced to 70 cents. To the saving shown by a simple mathematical computation must be added the enormous advantages which attend the fact that it is practical to apply acetylene appartus to coaches in such form that recharging may done anywhere, at any time, by such employers as may be present. No prophet is required to foretell the great progress acetylene must make on transportation lines.

Developments of the bicycle lamp for automobiles, carriages and lanterns bid fair to meet the demands of an exacting public which has been compelled to admit the efficiency of such devices while recognizing their limitations.

Single lights will continue to be a fine introduction of acetylene to many households, but until some cheap and effective system of refrigeration is developed and applied to table lamps their necessary bulk will keep them in a class which is designated as "portable" largely through courtesy or the license of the advertiser.

While generator development has been very rapid during the past five years, a little sober thought shows that most of the changes made have been in the direction of greater simplicity, which usually has resulted in better performance. Still more will simplicity mark the acceptable makes of generator which the market will demand in the future. Manufacturers who fail to meet this public demand will pay dearly for their folly.

Much has been written regarding types of generators which is justly regarded as empirical. The arbitrary dictum that one or another class or type of generators is condemned and unfitted for all purposes, will be modified by the real expert who has added to careful experiment and scientific tabulation a well assimilated and classified mass of information derived from actual experience and study in the lighting field.

Acetylenists of the better class already know, and in the future all will admit, that each installation is a problem by itself, to be carefully considered and decided right if all conditions are to be completely met and the customer of today made the friend and reference of tomorrow or next year.

No generator, and no type of generator, is "the best" for every installation. The size, requirements, occupancy and location must be considered. Nature of demand, class of attendance and climate even have a bearing upon performance—either low first cost, lightness, durability, compactness or economy of maintenance may be the one important feature to which all other considerations must bow, and in some cases an unstable foundation may compel the abandonment of all preconceived ideas. There are special applications that permit the sacrifice of everything else to secure automatic operation with an interval of six months between the times of recharging. There are other places where no carbide-feeding mechanism will be so good as an industrious laborer with a well hung shovel. Between the two extremes indicated there are occasions which will demand great variations in design to accommodate the generator to the needs of the buyer.

The "recession" type is ideal for many purposes; the "dump" or "carbide feed" seems to be imperative sometimes; for certain classes of service the "overflow" generator appears to meet every requirement; and there are abnormal conditions which make the condemned "drip" type the only available apparatus. Either one put in the wrong place will bring disappointment to the buyer and seller alike.

How may these places be distinguished or classified? That information will be part of the capital of the intelligent and diligent student of acetylene who one day will class as an engineer.

Burners must be selected under many of the rules that apply to the choice of generators. There are times when durability may be profitably sacrificed to secure maximum efficiency, but it will more often be found desirable to have burners durable at all hazards with the greatest efficiency that appears possible under the circumstances. Price, while a secondary consideration, should show a downward tendency as production increases and facilities are improved.

Purification in the ordinary small outfit has been the basis of much humbug in the acetylene business. The bubbling of gas through water will never remove the products of polymerization, nor the small particles of impurities held in mechanical suspension. The mechanical scrubber will be adopted as a part of every permanent installation, and in extreme cases, where proper attendance is at hand, some chemical purifiers will be placed, though the general use of such appliances seems remote at this time.

The application of carbide, acetylene and residuum to uses outside the lighting field are not properly part of this presentation, but in passing it is proper to note that they will have a wide application in agriculture, therapy, pharmacy and applied chemistry. The pure chemistry of acetylene seems to be well settled, but there are several directions which experimental science may take that promise results. Inasmuch as the use of acetylene and air mixtures through pipes is impracticable, there is a field for a satisfactory cheap gas to serve as a dilutant for acetylene, which shall be harmless and practically of the same density, so stratification may be reduced to the minimum.

In the production of carbide the discovery of a proper flux and the maximum utilization of waste in by-products or in the preparation of materials offer inviting openings for investigators.

In view of the great variety of elec-

tric furnaces already developed radical departures seem improbable, but no one can gainsay the fact that every advance in electrical development means a corresponding forward stride in the production of carbide, with benefit to the acetylene industry.

The price of carbide to the consumer will always be a prime factor in the extension of the acetylene business, so that carbide processes are worth consideration. Experiments on a large scale have demonstrated that carbide of excellent quality can be made from many carbon bases, so it is possible that some materials less burdened with impurities than the coke now used will make easy the production of carbide more uniform in quality than any commercially known at this time.

The reduction in price made during the past year encourages the belief that the growth of the industry will bring about still further declines below the fairly reasonable prices ruling in most parts of the United States. Uniformity in the system of distribution must be brought about, and is coming slowly, but some radical departures from existing methods of transportation and packing should be made if the acetylene consumer is to be relieved of all the dead weight possible under the circumstances. Some way should be devised to inaugurate the use of a uniform returnable package containing about two hundred pounds. While the drums used are excellent for the purpose, a little reflection raises the question what they cost and what they are good for when empty. As they cost about ten per cent of the gross selling price and are practically worthless to most consumers of carbide, it is plain that their rational elimination means economy for the user of acetylene. Most things in this world work out about right, and so the hundred pound can may properly be considered a temporary expedient.

The patent office has been so hard worked by inventors and alleged inventors of acetylene appliances that it looks to a conserative observer as if the end were about reached. The future may see some radical departures in the direction of burners, but developments in other lines seems likely to be limited to minor improvementts. Before the real ownership of some devices now quite generally used is settled, there are indications that there will be some bitterly fought patent law suits, but common sense appears to dictate a policy in this connection which shall limit all annoyance and expense to the trade. The Electro Gas Co., claiming all the basic carbide and acetylene rights, owes it to its stockholders to protect the public against unwarranted attempts of adventurers and speculators to reap where others have sown.

Insurance permission under existing conditions is a precedent to the successful conduct of the acetylene business. From a position of prohibition in 1896 the underwriters have moved forward to the point of endorsing permits for the installation and use inside buildings of such apparatus as has passed the inspection of their engineers, and without additional premium.

During the past few months there has been some discussion of the question whether "approved" and "permitted" are equivalent terms. The distinction appears to be that appliances for extinguishing fires and reducing fire hazards may be "approved," while hazards themselves may be "permitted." If this is accepted as a proper version of the matter, it is certain that the record of acetylene generators in actual use will entitle them to be advanced fom the class of "permitted" to that of "approved" devices, and it does not seem a far cry, if facts count more than theories, to the time when the standard fire policy now carrying permission to use kerosene and store five barrels on the premises will grant the occupant the right to use acetylene or ignore the matter entirely. It does not seem unreasonable to expect that in many cases where other lighting systems are displaced, reductions in premium rate will accompany the installation of acetylene. Such action is justifiable, and will prove profitable for the underwriters who take the advanced position.

Marketing is the great acetylene problem. Scientifically, experimentally, technically, mechanically, acetylene has reached a stature worthy of every consideration. Commercially it is still in swaddling clothes. Vast sums have been spent in exploiting it, years of active life have been devoted to it, but to the great mass of the people it is but a beautiful chimera. In spots, where conservatism and egotism have not gone to seed, the friends of acetylene have succeeded in proving their right to live and thrive; their patrons rise up to call them blessed, and carping critics have been forced to cease their unwarranted attacks. The good record will continue to be made, but the advance will be in geometrical instead of arithmetrical progression; now it is a question of multiplication, not slow-moving addition.

The satisfaction derived by a user of acetylene from his apparatus is very closely related to the expertness of the man who attended to his installation. This being the case, it is natural that much of the best work has been and will be done by traveling representatives of manufacturers. However, such methods are unduly expensive, and it behooves the continuously successful builder of generators to secure and retain local representatives who will qualify themselves to handle the business. Specialists are best, but circumstances limit their usefulness for some time to a relatively small number of points. The established dealer who is qualified to install generators and pipe buildings for many years must be the outlet for the manufacturer. Plumbers, fitters, tinners and machinists with a fair mechanical equipment and a reasonable amount of energy will discover in acetylene a source profit and reputation if they choose reliable generators from established responsible manufacturers who will properly guarantee their goods. In the face of such competition the fakir must go back to the gold brick business and the experimental tinker cannot secure a hearing.

The future checks upon the introduction of acetlyene like those of the past, will be ignorance, doubt and fear. Many men of letters, and men of affairs are densely ignorant about some things—acetylene is one of those things.

There is a peculiar quality of human nature that will cause men to face bravely any danger which is seen while seeking every means to avoid the possible terrors of the unknown which some times develops genuine fright before the innocent cause of all the imaginary trouble appears in plain view. There is nothing quite so sure to strike terror to the mind of a child as the sigh of a vibrating chimney-hole cover on a blustering, windy night, but the dread is gone when the cause is located and explained. In the same way will the preiudice now existing in some quarters be dissipated when a little accurate information is allowed to climb over the high wall of self-satisfaction with which these ultra conservatives have surrounded themselves.

If a man is intelligent he needs nothing but education to make him a radical on the side of acetylene—and more radicals are made each month as the scope of the acetylene industry extends.

Education will proceed through many channels.

In the past the advertising matter of the interested promoter has been largely discounted by a discerning public, and that habit of thought will make the future force of such publications doubly difficult to secure, but it is daily receiving reinforcement in the writings prepared by professors and students in schools, colleges and universities, as will continue to be the case, for the "witchery of acetylene" once experienced is never entirely overcome. Trade schools and technical institutions are making brief courses in acetylene part of the curriculum and it is becoming a more prominent subject of discussion at the meetings of trade associations and learned societies. The information thus acquired will be retailed more and more as time goes on until the first thought of one needing light will be "Acetylene."

Better though, than all these centers of advanced thought, is the quiet demonstration of a satisfactory acetylene generator in actual use. Tome of scientist, essay of scholar, elaboration of editor, screed of advertiser, persuasion of salesman, not one will equal in educational value the quiet testimony of friends already heard in the land, "Certainly acetylene is all right, have used it for years."

The general use of acetylene will develop through the natural steps of performance, education, knowledge, wisdom, happiness. Opposition serves only to give it more prominence. "Truth is mighty and will prevail."

A Story with a Moral.

Lead pipe thieves have unwittingly almost destroyed a strong friendship that has existed for years between a well known plumber and a jobber in plumbers' supplies equally well known.

"Say, Plumber, old man," said Jobber, one day this week, "I've got the finest thing in closets you ever saw. Something new and good."

If there was any one thing Plumber was looking for that thing was a good closet.

It just took Jobber a minute and a half by the clock to get Plumber to the rear of his store, where he could show the working of the new closet.

The two examined the tank and seat, discussed the maker's reputation and prices, then Plumber asked how it worked.

"Fine as silk!" exclaimed Jobber, thinking of a big order. "Doesn't make a sound. Here, stand here while I show you."

Jobber gave the chain a perk; there was a sound as of falling water—in fact, there was falling water, and lots of it at that. Lead pipe thieves had done their work well. The liberal sized stream of water that struck Plumber between his neck and collar and went on, on, on, and came out at the foot end of his trousers, quickly flooded the floor.

Plumber made a grab for his wilted collar, a pained look came over his face, and then, letting out a yell that shook the entire neighborhood, shot out of a rear door and down an alleyway; but he hasn't reached his shop yet—at least, Jobber hasn't been able to find him "in" by 'phone.'

Joint Meeting of the Confederated Supply Associations at Detroit, Mich., June 17-19, 1901.

DETROIT, the beautiful, was the scene of a three days' convention of the supply men on Monday, Tuesday and Wednesday, June 17-19. Perhaps the most sonorous description of the purpose of the conferences was given by one of the local papers whose reporter blandly observes that the "sphere of the associations is to regulate and adjust the irregularities of trade, to bring about uniformity in the sizes of joints and fittings, to adopt standard threads and couplings and to adjust credits." With this explanation of why they came it may be well to tell who was there.

The convention was one of the regular meetings of the affiliated associations comprising the Confederated Supply Association. The Association of Manufacturers and Jobbers of Plumbing Supplies, commonly called the eastern association, was well represented. The Central Supply Association, being on its own stamping grounds, had a large delegation, while the Pacific Coast supply associations had a single representative present, Mr. R. W. Kinney. Conferences and committee meetings were also held by the range boiler manufacturers, the soil pipe manufacturers, the makers of sanitary earthenware and the Association of Steam Brass, Gas and Water Work Manufacturers.

Secretary C. W. Woodward, of the eastern association, reported the following firms as represented at the convention:

Hoy & Co., Albany, N. Y.
Henry McShane Mfg. Co., Baltimore, Md.
Jas. Regester's Sons Co., Baltimore.
Jas. Robertson Mfg. Co., Baltimore.
W. B. Hubbard & Sons, Boston, Mass.
Dalton-Ingersoll Co., Boston.
W. A. Case & Son, Buffalo, N. Y.
Frank J. Knox Co., Hartford, Ct.
Fleck Bros., Philadelphia, Pa.
Haines, Jones & Cadbury Co., Philadelphia.
The R. C. McClure Co., Syracuse, N. Y.
The Chas. Millar Sons Co., Utica, N. Y.
Callahan Supply Co., Worcester, Mass.
Rome Sanitary Works, Rome, N. Y.
Haydenville Co., Haydenville, Mass., and New York City.
The E. S. Wheeler & Co., New Haven, Ct.
Colwell Lead Co., New York City.
Central Foundry Co., New York City.
Standard Sanitary Mfg. Co., New York City.
John Simmons Co., New York City.

The following firms were represented by proxies:

Brown & Wales, Boston, Mass.
Geo. E. Gilchrist Co., Boston.
Locke-Stevens & Co., Boston.
F. W. Webb Mfg. Co., Boston.
Bridgeport Steam Heating Co., Bridgeport, Ct.
Dixon & Ballou, Buffalo, N. Y.
D. L. Hamill, Buffalo..
Plumbers' & Steam Fitters' Supply Co., Buffalo.
Schaefer & Co., Buffalo.
A. J. Fullmer & Co., Camden, N. J.
S. B. Hubbard Co., Jacksonville, Fla.
Roe & Connover, Newark, N. J.
Walls & Pearsall, Philadelphia, Pa.
Samuel Sloane & Co., Rochester, N. Y.
Lincoln Iron Works, Rutland, Vt.
Delaware Electric & Supply Co., Wilmington, Del.
Warren-Balderston & Co., Trenton, N. J.
Dimock & Fink Co., New York City.
Nason Mfg. Co., New York City.
Henry Stein, New York City.
W. S. Emery, New York City.
Froehlich Bros., Philadelphia, Pa.
Irwin & Mitchell, Philadelphia.
McCambridge & Co., Philadelphia.
Newell & Booth Co., Philadelphia.
Owen & Salter, Philadelphia.
Stambach & Love, Philadelphia.

The Central Supply Association had the following members in attendance or represented:

ANNISTON, ALA.

Hercules Iron & Supply Co., H. C. Weeden.

CHICAGO, ILL.

American Radiator Co., C. K. Foster.
American Shot & Lead Co., A. C. Davis.
Blatchford, E. W. & Co., proxy.
Clow & Sons, Jas. B., W. E. Clow.
Crane Co., A. F. Gartz.
Davis Co., John, proxy.
Gould Co., proxy.
Holland Radiator Co., J. E. Holland.
Illinois Malleable Iron Co., J. F. Steneck.
Kellogg-Mackay-Cameron Co., proxy.
Monash-Younker Co., proxy.
McDonald Co., A. Y., John Morrison.
Peck Bros. Co., A. D. Saunders.
Raymond Lead Co., proxy.
Sanitary Specialty Mfg. Co., H. Verbeek.
Street & Kent Mfg. Co., C. D. Street.
Western Plumbing Supply Co., proxy.
Wolff Mfg. Co., L., John F. Wolff.

CINCINNATI, O.

Crane-Hawley Co., Geo. B. Hawley.
Douglas Co., John, John Douglas.
Merkel Bros., A. Merkel.
Powell Co., Wm., Jas. Powell.

CLEVELAND, O.

Fisher Co., E. W., E. W. Fisher.
Kennedy Co., W. G. Callow.
Ohio Brass & Iron Mfg. Co., H. N. Welker.

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FOR HAND OR POWER

Occupy less floor space. require less power to run, more simple of construction, far cheaper than any other machine of same size.

Ratchet Drills, Ratchet Die Stocks, Malleable Iron Pipe Vises

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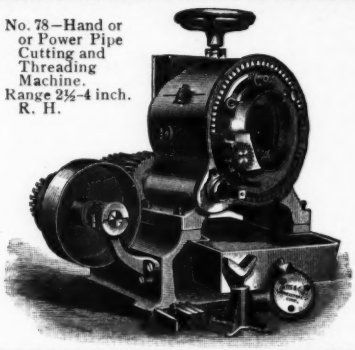

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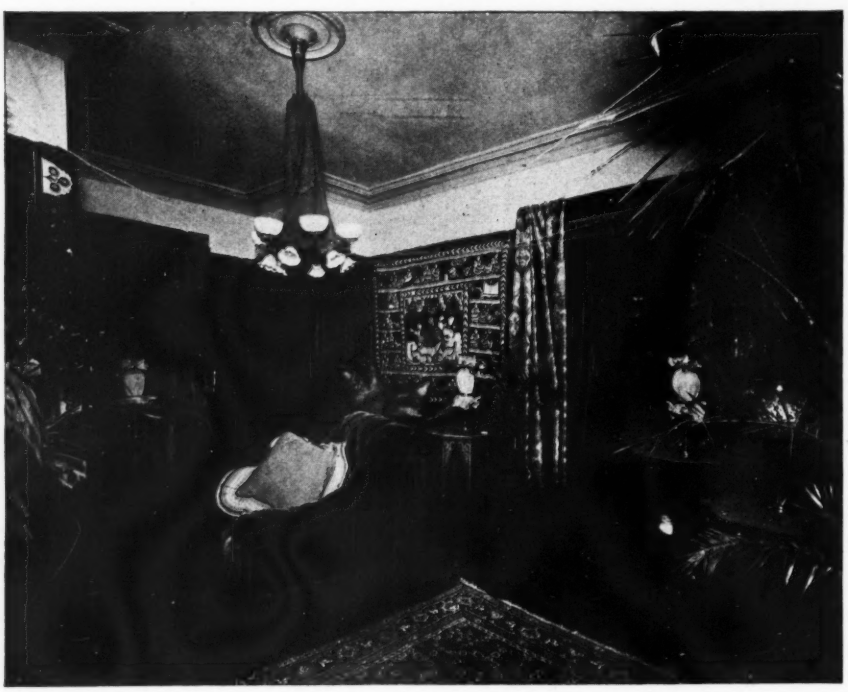
COLUMBUS, O.
Columbus Brass Co., proxy.
DALLAS, TEX.
Sullivan, D. F., proxy.
DAYTON, O.
Dayton Supply Co., proxy.
DENVER, COLO.
O'Fallon Suppy Co., M. J., proxy.
DETROIT, MICH.
Buick & Sherwood Mfg. Co., Theo. Ahrens, Jr.
Detroit Lead Pipe & Sheet Lead Works, E. A. Morris.
Detroit Range Boiler Co., Arthur Parker.
Detroit Sanitary Supply Co., A. C. Cogswell.

INDIANAPOLIS, IND
McElwaine-Richards Co., H. M. Haldeman.
KANSAS CITY, MO.
Young Supply Co., W. B. Young.
KOKOMO, IND.
Great Western Pottery Co., F. W. Conradt.
LA CROSSE, WIS.
Roosevelt Co., W. A., J. P. Felter.
LINCOLN, NEB.
Cooper & Cole Bros., proxy.
LOUISVILLE, KY.
Ahrens & Ott Mfg. Co., Theo. Ahrens, Jr.
MANSFIELD, O.
Humphreys Mfg. Co., W. B. Blowers.



Ideal Manufacturing Co's. Turkish Parlors. A favorite Resort of the Supply Men at the Detroit Convention.

Harvey's Sons' Mfg. Co., A., Jas. Harvey.
Ideal Mfg. Co., Frank Dwyer.
Sales Bros., M. W. Sales.
Walker & Son, Jas., John Walker.
DUBUQUE, IA.
McDonald & Morrison Mfg. Co., A. Y., John Morrison.

MILWAUKEE, WIS.
Hoffman Mfg. Co., B., proxy.
Hoffmann & Billings Mfg. Co., E. F. Niedecken.
Rom Co., Robt., proxy.
Rundle-Spence Mfg. Co., F. K. Dibley.
Windsor Mfg. Co., W. R. Davis.
Winterfield Co., Chas., proxy.

MUNCIE, IND.
Keiser & Co., Geo., proxy.
NEW BRIGHTON, PA.
Dawes & Myler Works, F. J. Torrance.
NEW YORK, N. Y.
Central Foundry Co., F. G. Ross.
OMAHA, NEB.
Crane Co., proxy.
United States Supply Co., J. B. Rahm.
PITTSBURG, PA.
Bailey-Farrell Mfg. Co., H. H. Bailey.
Fort Pitt Supply Co., J. M. Young.
Mansfield Mfg. Co., Geo. R. Acheson.
Oil Well Supply Co., proxy.
Pittsburg Supply Co., O. F. Felix.
Scaife & Sons, W. B., proxy.
Standard Sanitary Mfg. Co., F. J. Torrance.
ST. LOUIS, MO.
N. O. Nelson Mfg. Co., N. O. Nelson.
Rumsey & Sikemeier Co., W. C. Rumsey.
Western Brass Mfg. Co., proxy.
ST. PAUL, MINN.
Crane & Ordway Co., proxy.
Western Supply Co., proxy.
SHEBOYGAN, WIS.
Vollrath Mfg. Co., Jacob J., C. J. Vollrath.
TOLEDO, O.
Grosswiller Supply Co., Jos. E., J. F. Grosswiller.
National Supply Co., J. H. Stoddard.
UNION CITY, IND.
Knapp Supply Co., proxy.
WICHITA, KAS.
Rodolf, R. O., R. O. Rodolf.
WARREN, O.
Day-Ward Co., Mr. Day.

It was impossible to get a complete list of the firms represented at the meetings of the manufacturers in different lines, but representative men in each branch of the trade reported no important changes in price and no startling developments in trade conditions. All of the manufacturers report their books "chock full" of orders and signs of the times most encouraging.

The newly elected president of the National Association of Master Plumbers, Mr. E. D. Hornbrook, of Kansas City, Mo., had been invited to be present informally, and to consult with the joint committee of the supply men about trade matters. He was accompanied by Executive Clerk W. Emmett Crosby.

Of course all meetings were executive and the newspaper boys had much time on their hands to view the beauties of Detroit. Very little was given out for publication except that the conferences had nothing to do with the discussion of prices, but that a number of resolutions had been unanimously adopted by the associations sitting in joint session

which would be of vital importance to the trade in general, and which would be made public in due time. The officers report that the utmost harmony prevailed throughout all the meetings and that they expect great good to result from the work done in Detroit.

One important change was announced by Secretary Woodward, namely that the Association of Manufacturers and Jobbers of Plumbing Supplies had resolved by unanimous vote that on and after July 1, 1901, a charge would be made for boxing and packages. Notices will be sent out from the office of the secretary to members of the association, who will in turn notify the trade in general of this action.

There were no busier men at the convention than the secretaries and their assistants. Mr. C. W. Woodward, of New York City, acts in this capacity for the Eastern Association, and Mr. Paul Blatchford, of Chicago, for the Central Supply Association. Mr. Frank S. Hanley, of New York, is Mr. Woodward's assistant and Mr. Geo. F. Tompkins, Chicago, assists Mr. Blatchford. They are all quite beyond the reach of the wiles of the ordinary newspaper man.

Another View of Ideal Mfg. Co's. Parlors.

The following new members were admitted by the Central Supply Association at this meeting:

Day-Ward Co., Warren, O.

Knott-Van Armem Mfg. Co., Coldwater, Mich.

Sanitary Supply Co., Grand Rapids, Mich.

Kansas City Pump Co., Kansas City, Mo.

American Pump & Supply Co., Toledo, O.

American Foundry & Pipe Co., Pittsburg, Pa.

Spang-Chalfant & Co., Pittsburg, Pa.

It is a rule of the supply associations that the supply men of the city in which a convention is held shall not provide elaborate entertainment for the visiting members. This rule the Detroit men found it hard to live up to, and some of them were guilty of a flagrant violation, their civic pride requiring them to set Detroit's reputation for hospitality above any man-made rule. The Northwestern Foundry & Supply Co., of Detroit and Big Rapids, provided a tally-ho ride for the soil pipe men on Monday afternoon and after a long ride about the city and its island park took them to the Hotel Cadillac for an evening banquet. The Ideal Manufacturing Company provided "central supplies" at their Turkish parlors in the Hotel Cadillac and met socially pretty nearly everyone in attendance at the convention. The attractions were many and it was not a hard thing to beguile those who had once made their way over from the Russell House—convention headquarters—to come again and yet again. In the first place it was a thoroughly enjoyable place, electric fans being hidden in the foliage of the palms and wafting cool breezes to the heated brow. Then the entertainment was of the best. Refreshments for the body were pressed upon the visitors by two solemn-looking Turks in bloomers, and refreshment for the mind was provided by a banjo quartette and by a young sleight of hand performer, who pleased and puzzled all by his clever manipulations of cards and coins and the other paraphernalia of his craft. The parlors were in charge of the following gentlemen of the company: Messrs. Frank T. Dwyer, B. O. Tilden, J. E. McCormick, J. P. Feeley, Jr., P. E. McDonald and Michael Sullivan.

The social event of the convention was the boat ride on the Detroit river which had been provided for Wednesday's diversion by the local supply men. The committee of entertainment was composed of the following gentlemen and the day's pleasure was a constant testimonial to the fact that they had done their work well:

E. A. Morris, chairman; Messrs. Jno. Walker, Murray Sales, F. T. Dwyer, Jas. Harvey, A. A. Parker, Chas. Deuel and A. C. Cogswell.

The steamer "Promise" left the foot of Woodward avenue at about 10:30 Wednesday morning, and it is noteworthy that only one benighted supply man failed to be on hand at the appointed hour. The command was given "around the Island," and the boat was headed up river, passing on one side of Detroit's beautiful island park, running a short distance into Lake St. Claire and back on the other side of the island, giving everyone an idea of the size and beauty of this people's pleasure grounds. It is truly an ideal breathing spot for the city's populace.

As the boat passed Woodward avenue on its way down to Lake Erie someone on the dock gave the hail sign of distress and the master of ceremonies, recognizing Mr. J. B. Wise, of Watertown, N. Y., ordered the boat headed in and Mr. Wise took a flying leap and was hauled aboard by willing hands as the boat glided past the dock. The length of the leap was anywhere from ten to twenty-five feet, according to who you asked, but it must have been a record-breaker in any case.

The trip down stream was delightful in every particular. The river breezes were most refreshing after the heat of the city, the scenery along the river banks was rich in variety and at some points of great beauty, and best of all, the company aboard was most congenial. of the out-of-town ladies there were perhaps a baker's dozen, as follows:

Mrs. J. A. McDougal, New York City; Mrs. Edw. C. Regester, Baltimore; Mrs. H. T. Sherriff, Chicago, Mrs. T. A. Callahan, Worcester, Mass.; Mrs. Jos. Groswiller, Toledo, O.; Miss Merwin, Massilon, O.; Mrs. Theo. Ahrens and Miss Ahrens, Louisville, Ky.; Mrs. E. W. Fisher, Cleveland, O.; Mrs. Jno. Douglas, Cincinnati, O.; Mrs. Jas. Stoddard, Toledo, O.; Mrs. W. C. Rumsey, St. Louis, Mo.

Detroit ladies were present in large numbers and appointed themselves a committee of the whole to look after the comfort and entertainment of the visiting ladies. Following is a pretty complete list of those aboard:

Mrs. G. H. Andrews, Mrs. E. A. Morris, Mrs. H. L. Timm, Miss Newman, Miss Cogswell, Mrs. A. H. Hatch, Mrs. E. M. Vosburg, Mrs. J. P. Feeley, Jr., Mrs. Margaret Bush, Mrs. Hattie M. Bower, Mrs. M. B. Rawley, Miss Cressey, Mrs. J. P. Buckley, Mrs. E. V. Brigham, Miss Edna Mann, Mrs. Jno. Walker, Mrs. G. R. Jenking, Mrs. Hobbs, Mrs. C. C. Denel, Mrs. A. Harvey, Mrs. Jos. Harvey, Mrs. H. B. Cope, Mrs. David Buick, Miss Fannie Buick, Mrs. A. E. Noble, Mrs. M. S. Edwards, Mrs. John Trix, Mrs. Ferguson, Mrs. Leipzizer.

The down trip was a run of some twenty miles to the entrance of Lake Erie, a short run in the lake and a return to Bois Blanc, an island in the mouth of the river commanding a view of the lake. During the progress of the trip an excellent lunch was served by a Detroit caterer and those who were not contented simply to take in the beauties of water and shore line amused themselves by dancing and other recreations.

Just before the boat landed at Bois Blanc the Detroit supply men called for a speech by that father in Isreal, N. O. Nelson, of St. Louis. Mr. Nelson opined that the Detroit men were anxious to put him up because they knew that he would throw bouquets at them for their magnificent entertainment, a thing which he professed his intention not to do—and then did. He laid great stress upon the surprise which strangers in

Detroit always feel at the beauty of the city and the hospitality of the citizens. He told of the trip which one of the local firms had arranged for Monday evening, when the early arrivals were taken about the city and to the beautiful Belle Isle Park in tally-hos, dwelling upon the natural attractions and the civilized attractions of the city and its environs.

He then expressed the sympathy which the visitors felt for the city in the death of one of its leading citizens, ex-Mayor Pingree, who died in London the early part of the week. To Mr. Pingree more than to any other one citizen Detroit owes the impetus which has made it world-renowned for civic spirit and enterprise.

Mr. Nelson then proceeded to deliver a little preachment on the beauty of civic righteousness, making a strong appeal for good government, telling of the need of great public generosity in the administration of public institutions, and laying especial street upon the beneficial influence upon the people of a "handsome out of doors" as well as a handsome home environment. In the matter of freedom from smoke, clean streets, etc., Detroit, so the speaker said, was pre-eminent. No wonder the people of Detroit are hospitable. It must be a pleasure for a Detroiter to show strangers the beauty of their city. The speaker closed by extending hearty thanks to our hosts for their enthusiastic and whole-souled entertainment.

The speech, begun in frolicsome spirit, had much of that "backbone of true eloquence, common sense," and was heartily applauded.

Half an hour was spent ashore, the supply men and their ladies mingling with the merry crowd of Detroit pleasure seekers who were spending the day on the island. A base ball game being in progress a goodly number of the men proceeded to hunt up the bleachers and root for the players as though the game was their own. It was a pretty poor game but it was sufficient to arouse the enthusiasm of every lover of the great American game.

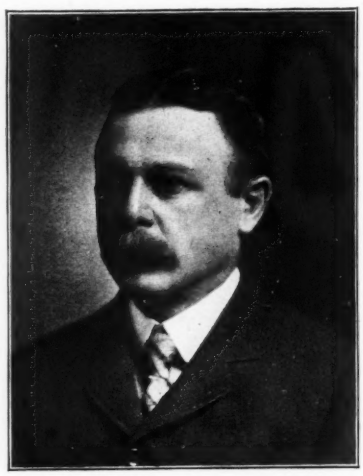
On the return trip the different associations represented held a short but necessary joint session, much to the disgust of the ladies, who, however, found consolation in the tricks of Mr. Leipziger, the prestidigitator, who showed them just how every trick was done and then proceeded to do it another way. After the joint session was over he gave a formal exhibition of his powers which occupied the balance of the trip and called forth much applause and many an exclamation of surprise and amazement.

The boat reached the home dock about 6 p. m. and after a universal handshake the merry party quickly broke up and scattered in every direction. Most of the visiting members caught trains out of Detroit during the evening but some lingered to enjoy for a few days more the hospitality of a city which enjoys the rare distinction of being at once a busy, bustling city and a summer resort sought out by travellers from many parts of the country.

A Visit to Kewanee Boiler Co's. Works

In order to give the heating trade a comprehensive idea of the size of the Kewanee Boiler Co.'s new works, at Kewanee, Ill., a number of gentlemen were invited to visit the plant on June 4. The Kewanee Boiler Co. supplied a special car, which left Union station, Chicago, at 9:05 a. m. on that day. The following members of the heating fraternity from Chicago and Milwaukee were on board:

William Sullivan, Chicago.
Edward Sullivan, Chicago.
Edward Sullivan, with P. T. Maloney, Chicago.
S. I. Pope, Chicago.
C. Schweitzer, Chicago.
Albert Cook, Chicago.
Thos. Rushbrook, Chicago.
D. E. McCabe, Chicago.
Chas. Kruse, Chicago.
E. F. Capron, Chicago.
T. J. Waters, engineer City Schools, Chicago.



E. E. Baker, President.

A. H. Robinson, Chicago.
Robert Gordon, Chicago.
John Kehm, Chicago.
F. W. Lamb, Chicago.
R. S. McDonald, Chicago.
C. V. Kellogg, Chicago.
Aug. Schroth, Chicago.
B. F. Schampel, Chicago.
W. A. Green, Chicago.
Geo. Dixon, Jr., Chicago.
J. J. Spear, Chicago.
Geo. Getschow, Chicago.
W. A. Pope, Chicago.

J. P. Dugger, Secretary.

T. J. Douglas, Chicago.
R. Cordes, Milwaukee.
F. Wagner, Milwaukee.
A. G. Foote, Milwaukee.
L. Griewisch, Milwaukee.
C. K. Foster, Chicago.
M. J. Cragin, Chicago.
J. V. A. Weaver, Chicago.
F. J. Norton, Chicago.
J. P. Dugger, Chicago.
S. O. Dugger, Chicago.
John Duncan, Chicago.
Julius Forster, Chicago.
S. P. Johnston, The American Artisan, Chicago.
Chauncey L. Williams, The Engineering Review, Chicago.
F. P. Keeney, "Domestic Engineering, Chicago.
W. A. Douglas, The Metal Worker, Chicago.

The journey consumed about three hours, during which the company entertained its guests with cards, cigars and other refreshments. The train was met at the station by E. E. and B. F. Baker who escorted the guests to the Kewanee House where luncheon was served. At 1 p. m. the delegation again boarded the car and after a short ride found themselves at the new plant of the Kewanee Boiler Co. The breaking of the ground for this plant was in April, 1900, and the works were started in September of that year, but an additional 100 x 40 feet has already been made.

First the warehouse, 110 x 50 feet, with its large supply of boiler parts, etc., was inspected, and then the office building, shipping room, etc., 160 x 40 feet, were visited. The firm has very excellent facilities for making prompt shipments with the least degree of handling. The offices are very attractive, finished in oak and ornamental iron work. Good light is given them and up-to-date business facilities are provided.

B. F. Baker, Treasurer.

The boiler shop was next visited, a building 100 x 40 feet which has just been completed. The raw material enters the six-acre plant at this building and is thence passed along by traveling cranes, three of which pass it over 200 feet of ground. It is operated on by punches, riveters, and other tools and soon takes on the appearance of a boiler. A sliding table moves the plates one quarter inch thick along as a punch makes holes for riveting. The sheets for different parts pass through Lenox bevel shears which cut off the ends of the plate and they are passed through huge rollers which shape them. They are then taken up into the riveting tower which is 60 x 28 feet and here red hot rivets are picked up by tongs and driven into the holes by four hydraulic riveters. The pressure exerted on the rivet as it is being driven in is 1,500 pounds.

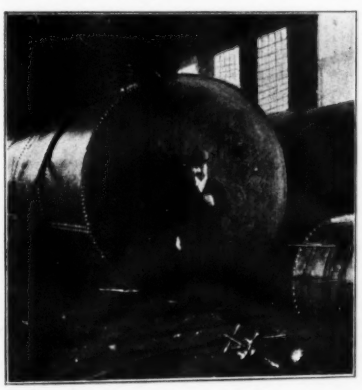
The visitors then went into the erecting shop 224 x 60 feet where pneumatic machinery puts the finishing touches on. One tank in this room being constructed for a water works company in Iowa was 8 feet in diameter and 36 feet long. The boiler room came next in order. Three Kewanee boilers, two being 60 x 16 feet and the third 48 x 16 feet, furnish the steam power for the building, and there are three air compressing engines. The office was next visited and lemonade was served to the guests, after which the machine shop was gone through and the operation of bending and flanging red hot plates of iron for boiler heads was

very much enjoyed. The foundry 128 x 60 feet was visited and great boiler castings were seen in the sand. The daily pour is from seven to eleven tons. The pattern shop is near by in which the firm make their own patterns.

The guests were then taken in carriages for a ride around the city, after which the special car was switched into the Western Tube Co.'s plant where they

A. T. KELLOGG, HEAD OF DRAUGHTING AND DESIGNING DEPARTMENT.

were met by Secretary C. I. Pierce, E. C. McCullough and Sam O. Dugger. The first room visited was the core room where over 100 girls are employed. Next came the malleable iron foundry, one of the largest of its kind in the United States. Then the annealing department was visited where there is one of the largest banks of annealing furnaces in the world. Next in order was the machine shop, then the stock room. The fittings are carried from one department to another on a movable platform which enables one to observe a fitting during the entire process of manufacture, from



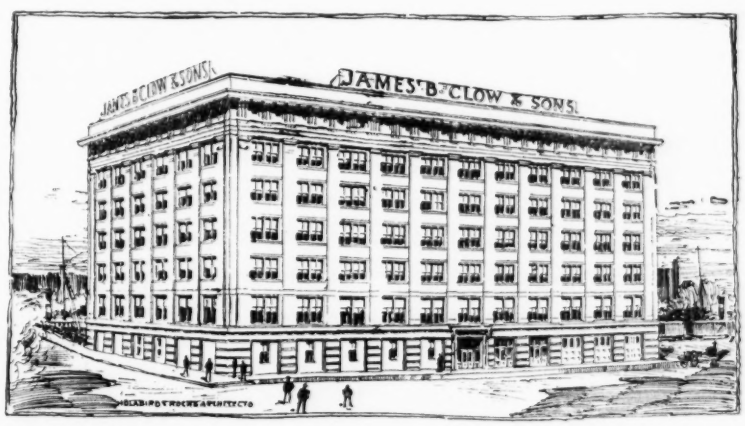
40-FT. AIR PRESSURE TANK, AND M. F. MOORE, HEAD OF THE TUBULAR BOILER DEPARTMENT.

the core room to the stock room. The party then visited the wrought pipe mill which was one of the most instructive and interesting sights of the day, after which came the foundry, power house, and brass foundry.

Because of a lack of time the guests were obliged to omit visiting a portion of the works. The size of the Western Tube Works' plant was a revelation to all. There are now 2,600 men on the pay roll, and they have under construction an addition which will be the largest grey iron foundry west of Chicago. At 5:20 p. m. the party boarded their special car for the return trip to Chicago and a very excellent dinner was served en route in the dining car. Chicago was reached at 8:30 p. m. and the large number of guests will not soon forget the hospitality of the Kewanee Boiler Co.

Jas. B. Clow & Sons' New Building.

James B. Clow & Sons, manufacturers of cast iron water pipe, radiators, steam and plumbing goods, have just awarded the contract for a new fireproof warehouse building and a separately constructed marble mill. Work will be begun at once on the building, the site selected being at Franklin and Harrison streets and the south branch of the Chicago river, recently leased by James B. Clow & Sons for a term of ninety-nine years from M. C. McDonald. The lot covers an area of 27,000 square feet. Negotiations for the lease were made by Dunlap Smith & Co. The marble mill is to be completed by the middle of August, and the main building to be ready for occupancy Dec. 1, this year. The main building is to be seven stories and basement in height, with a frontage of 100 feet in Harrison street, and 177 feet in Franklin street, with 177 feet facing



the river. The building is to have pile and concrete caisson foundations extending to the hardpan immediately above bedrock. It will be of strictly fireproof construction, with steel beams, columns, etc., and hollow terra cotta tile arches and partitions. The exterior of the building will be faced with dark-red terra cotta and pressed brick on all three fronts, the river front being as completely finished as those on the street. The glass for exterior windows is ribbed, except plate and luxfer prisms in second story on all fronts. There will be one electric passenger elevator and two large electric freight elevators, one steel freight chute, one spiral package chute, electric trolleys on various floors, tracks for trucks in the basement and all modern improvements for economical and rapid handling for the heavy merchandise of a plumbing, steam and water works supply house. The plumbing of the building will be a feature in itself, and exponent of all that is best in factory plumbing equipment, including filtered ice-water service, special wash sinks, rain baths for employes, lavatories and other toilet conveniences of the latest types, set in rooms finished in marble, mosaic and slate. The building will be heated by steam, and the offices will have a complete heating and ventilating system, the air being supplied with a forced blast, causing the air to pass over heated coils. The interior walls will be plastered and whitewashed or tinted throughout. The floors will be maple. The building will be electric lighted. The basement will be fitted up for the storage, handling and cutting of iron pipe; the first story for the greater part as a stock room for the supply of city trade, the office of the city salesman being on this floor, together with the shipping department. Leading up from the sidewalk at the center of Franklin street front is a very wide and finely finished marble stairway, with vestibule and hallway finished in mosaic and marble. This stairway leads to the general offices on the second floor. Some 15,000 square feet are devoted to these second-floor offices, including fireproof vaults, file rooms, locker rooms, toilet rooms, etc., all finished in quarter-sawed white oak. The show room for display of plumbing fixtures, radiators, heaters, etc., will also be on this floor. On the fourth floor will be located the lockers, lunch rooms, bath rooms, toilet rooms, etc., for the employes in general. The remainder of this floor and all the third and fifth floors will be utilized for storage. The sixth floor will be used for the manufacture and assembling of plumbing fixtures and the seventh floor devoted to a large brass foundry, with its molding, sand, metal and core rooms and the machine shops. A special feature of this floor is its "saw-tooth" roof of glass and sheet metal, which gives north light from overhead, the arrangement being such that every nook and corner is as light as out of doors. The tanks for water will be on the roof. On a triangular piece of ground between the main building and the river will be located a two-story marble mill, including saws, rubbing beds, molding machines, polishers, etc., for the manufacture of all marble in connection with plumbing supplies. Between the main building and this marble mill is a depressed railroad track connecting directly with the Great Western and Chicago Terminal railroads, affording receipt and shipment of goods at the building via every railroad entering or leaving Chicago. On each side of the yard track are platforms for the handling of goods. A heavy dock is being constructed along the entire 208 feet of river frontage, giving excellent advantage for lake and river shipment. This building is one of the best equipped in the country for the handling of heavy commodities, and the only one on the South Side having both river and railroad shipping facilities.

Mysteries of the "Pan Am." Midway

Charmed by the Midway E. C. revels in Oriental sights along with other Reubens. A glance at a few exhibitions in the lines covered by "DOMESTIC ENGINEERING."

By Elmer Crawford, New York City.

THE uncongeniality of old Sol during the early stages of the Pan-American nearly gave our exhibition an Alaskan shake, but now the sun bath is on tapis. To the uninitiated I will say this shake is marvelous in its adaptability to the human frame and has a peculiar see-saw effect upon his spinal combination. It nearly dried up the throats of all bent upon yelling "put me off at Buffalo." It made the thousands who intended to come think of heading for New Orleans. I believe you accent the last syllable of Orleans when you are broke and the first when flush. Ninety-nine per cent will be able to split the last half after partaking of the sights and listening to the entrancing pyrotechnics of the leather-lung orators along Midway. These sticklers for the mighty dollar are hired for their peculiar trait of being able to fog-horn the Midway atmosphere and by sheer force of lung power cause the Rubens to spend their quarters with the "only show" worth seeing. A more colossal and unique set of liars never drew breath and many of their faces I recalled as my mind reverted to the stirring hours spent along the famous highway of the World's Fair many years ago. Many of them preserved their magic tones in alcohol until gay Paris gave them an opportunity last year and they have since been lubricating with the ancient feeble-salve, which imparted a bell-ring to the world's greatest orator. The jumble-jointed pair of scissors in front of Bostock's roaring lions possesses a voice that easily cracks the lath and plaster mixture a mile away, known as Stadtler's largest world's hotel. My kingdom for wind, systematic wind, wind that will outride a cyclone, pervert the imagination of the ordinary mortal and herd the crowds in each show as easily as the Buffalo Forge Company's furious blowers elevate the midway airship in the eyes of all who take a "trip to the moon." Even sage Chauncey Depew was inveigled into boosting along the glories of the airship, so magically had the Buffalo Forge Company's marvelous fans lent an illusive tint to the optics of the post-prandial orator.

Well the homogeneity of us all, great or dwarfed in intellect as the case may be, was the foundation whence arose P. T. Barnum's famous bunco phrase. It takes all classes of people to make up the world and had Chauncey declared in the same breath that the Mares so graphically outlined by selenographers on this side of the moon were supplemented by similar depressions on the unseen reverse side, thousands would have believed in the potency of his words, for who can gainsay an unknowable point of this kind when it drops from the lips of the star orator. The imagination of mankind is swelled with figurative conclusions unless the veil surrounding the mystifying, conjuring attitudes assumed in the display is lifted, and the panoramic deception is sundered. The tricks of the venerable horse Blondin partake of human learning, and further along the midway the missing link housed in the palace dubbed the "Evolution of Man" easily spans the slight distance to the telepathic lady, whose study of human credulity has been augmented by a well grounded mastery of the inflections in the voice of her representative. Let no man be deceived, is the cry of the "Red Star" galaxy of sensationalists, as if a human being could be separated from his hard earned lucre by any fake along Midway. Impossible! If one imagines he gets his money's worth that is sufficient, without heralding the oft repeated version "when thieves fall out," etc.

However, the Midway, as a whole, is certainly worth a division of your time, and as a diversion from studying the multitudinous exhibits scattered about beautiful grounds, in highly decorated buildings, is a relaxation from the serious contemplation of the world stirring progress of the American nations as exemplified by the zeal with which the commercial and inventive genius has solved the problem of display. It is not my purpose to give you even a cursory portrayal of the sights to be seen, but it is worth going thousands of miles to view the awe inspiring electrical display which emblazens the triumph of the Buffalo exhibition upon the minds of all who witness the twilight merge into daylight at night and surely carries one back in thought to the portentious moment when the artillery of heaven guided and outlined in perpetuitam that inspirational oration "The Creation."

The following firms have well appointed exhibits in the various buildings:

E. W. Bliss Co.

The E. W. Bliss Co., of Brooklyn, present, in section 39, Machinery building, under the supervision of C. E. Pallard, an imposing array of power presses and dies and special machinery for sheet metal work. Among the machines exhibited are drawing presses, can machines, trimmers, threading machines, slitters, crimpers and wiring machines. Their powerful gang drawing press is a striking feature. This company are also manufacturers of the justly popular "Bliss-Heath" vacuum or atmospheric pumping engine for lifting water to the tops of factories, apartment houses, dwellings and country residences.

National Meter Co.

A display that is sure to charm the eye is that offered by the National Meter Co., of New York, in section 25, Machinery building. The division railings and all other metal work in their division are covered with a beautiful white enamel, presenting a striking and charming effect. They show four varieties of their famous water meter, the Empire, Nash, Crown and Gem, in sizes from six inches down to five-eighths of an inch. Some of the meters are connected with a water tank, giving a practical demonstration of their working. A handsome fountain occupies the center of the space. Edward Nellany is in charge of the exhibit.

Kelsey Furnace Co.

In the Manufacturers' Annex, section G, the Kelsey Furnace Co., of Syracuse, exhibits various sizes of the famous Kelsey warm air generator, which differs from any other heating system and is a marvel of economy and effectiveness. The largest size generator is No. 30, showing steam jacket devoid of casing. No. 21 has section of casing cut out so as to show inside operation and construction, and also shows water front used for heating water for bath room purposes. No. 24 shows generator complete with galvanized casing. All the furnaces show the latest improved grate and new cast iron back pipes, which previous to this year were always made of galvanized iron. All the castings used in the construction are of the best and most durable quality. The exhibit is set off by a large number of fine photos of residences, showing that these heaters are used in hundreds of the best dwellings throughout the country. Altogether it is one of the finest displays of the kind ever gotten up. The exhibit is presided over by Martin Fisher, the well known heating contractor of West Chippewa street, Buffalo, who is agent for this territory for the sale of the Kelsey warm air generator. Mr. Fisher extends a cordial welcome to friends and all who take an interest in heating matters.

Abendroth Bros.

The Pergola building, otherwise known as the Manufacturers' Annex, contains, in section G, an exhibit which is a model from an artistic as well as a practical standpoint. The one referred to is that of Abendroth Bros., of New York, under direction of R. L. Wood, showing their extensive line of steam and hot water heaters. The boilers and heaters, as well as the various adjuncts to the display, are done off in white enamel and gold trimmings and their space is tastefully decorated with palms. The "Perfect Gem" steam and hot water heaters are made for all the way from 225 to 2,350 feet of steam radiation and from 375 to 3,700 feet of hot water radiation. The "Round Gem" covers from 175 to 600 feet of steam, and from 350 to 1,100 feet of water radiation. The "Little Gem" No. 12, square top laundry heater, has a heating capacity of 75 gallons of water per hour. "Little Gem" dome top heater is for 250 feet of water radiation and "Little Gem" flat top water heater for 150 feet radiation. Another line of goods shown is their "York Gas Ranges," of which they make fifty different styles and sizes; also the "York Gas Radiators" in three different styles.

Rider-Ericsson Engine Co.

The Rider-Ericsson Engine Co., of New York, give, in block 25 of the Machinery building, a demonstration of the powers and accomplishments of the "Rider" and "Ericsson" hot air pumping engines. These machines are designed for pumping water for country residences, hotels, colleges, etc., and for irrigating vineyards and gardens. One of their chief recommendations is the fact that they are so simple and safe that any one can operate them, and the services of an engineer are not required. They have had a widespread sale in the United States during the past twenty-five years, more than 25,000 of them having been installed within that period. They are easy to set in position and connect with the water pipes. The largest engine will force water through piping to an elevation of more than 300 feet. The "Rider" and the "Ericsson" are each made in cylinder sizes of 5, 6, 8 and 10 inches, with hourly capacity varying from 150 to 3,500 gallons, on a basis of a 50-foot lift. D. M. Emery, who superintends the exhibit, shows in actual operation a six-inch "Rider" engine and an eight-inch "Ericsson" engine.

THE LUNKENHEIMER CO.

In section 46, Machinery building, a most complete line of brass and other metal goods for water, steam, air, gas, oil, etc., is shown by the Lunkenheimer Co., of Cincinnati, through their representative, Isador Rauh. Their offering includes a great variety of brass and iron body valves, stop check and safety valves, injectors, lubricators, oil pumps, oil and grease cups, oiling devices, whistles, cocks, guages and engineering appliances of every description. This company's reputation for reliable goods in their line is an enviable one.

FANEUIL WATCH TOOL CO.

J. P. Jordan, representing the Faneuil Watch Tool Co., of Boston, shows in section 42, Machinery building, a line of the accurate brass working machinery and tools made by his firm. The Rivett manufacturers' lathe is used largely by the manufacturers of plumbers' brass goods and other goods of a similar character. This machine is especially adapted for small brass work, screws, oil cups, etc., and is quite inexpensive in comparison with most tools of this kind.

J. H. WILLIAMS & CO.

"Wrench Makers to the People" is the title very appropriately claimed by J. H. Williams & Co., of Brooklyn, who have a display of comprehensive excellence in section 35, directed by Benjamin Whittaker, assistant treasurer of the company. It is doubtful if any concern in existence makes a more complete line of pipe wrenches, double end wrenches and other styles. Their Vulcan chain pipe wrench is known all over the habitable globe and is made in an immense variety of sizes. No other pipe wrench in the world is made in as large a size as the Vulcan and the range is from that all the way down to one that will take a one-eighth-inch pipe. They are made with either flat or cable chain, one of the most meritorious features being that the chain swinging from the center permits the use of either side of the tool without change. Special care is taken in tempering the jaws and the construction is so simple that any part can be readily and easily replaced. They also show full lines of standard drop forge wrenches, including 15 degree wrenches, S wrenches, set screw wrenches, etc. Also construction and track and car, and several other styles of drop forge spanners; drop forge lathe dogs with bent and straight tails, crank and machine handles, high bolts, hoist hooks and drop forge wire rope sockets, this firm being the first in the country to manufacture wire rope sockets without welding. They make and carry in stock a great variety of parts for different kinds of machinery, such as gas engines, shoe machinery, cream separating machinery, etc., and parts for shot guns and surgical instruments.

THE WESTERN TUBE COMPANY.

The exhibit of the Western Tube Company, of Kewanee, Ill., is situated in block 10 of the machinery division of the Machinery and Transportation building. The booth for this display has inside dimensions of 22x18 feet and is in every sense of the word a magnificent structure, substantial, elegant in proportions, artistic in detail and finish.

The woodwork is selected quarter-sawed oak, and the exterior, to complete a color harmony of the display, is stained a dark brown, which, in contrast to the stained glass windows, facade decorations of glass mosaics inlaid in wood, Alps green marble columns and bronze figures, form a striking effect. The side walls are of panelled oak, the roof, frosted glass, surmounted by a dome, representing the setting sun. On either side of the building chimneys, suggestive of the factories, are placed. Over the entrance and in front of the dome is a large bronze figure of an Indian.

The interior is prepared with even more care to artistic detail. It is divided into two rooms, one for exhibition and the other for reception purposes. The latter is designed more for pure comfort than for lavish display, but from its simplicity of finish lends a growing pleasure to the eye. The soft color scheme of pink and green is carried out in detail here, the woodwork being enameled a slight tint of pink, and the walls green. Paneled designs are the only mural decorations used. One end of the room is finished as an ingle nook, with settle, cushions and all the other appurtenances of a "cozy corner." The furniture is of solid mahogany, natural finish, upholstered in green leather.

In passing from the reception to the pipe and fittings room one sees a large panel bird's-eye view of the Western Tube Company's works. Black and gold are the predominating colors of the apartment. On one side is a large settle, inviting ease and comfort. Above it are decorative panels suggestive of trade in the two hemispheres, and between them a conventional figure in bronze, illustrative of the immense growth of the Western Tube Company—"Large oaks from little acorns growing." In the center of the room above the pipe rack is a figure of Genius holding high above her head a polished brass four-way cock, with a cluster of incandescent lights. The other electrical fixtures are polished brass valves with cupids turning on the steam. Large cases of green oak, with doors of French plate glass, contain the exhibit of grey and malleable iron and brass fittings, iron body valves and cocks, and brass and steam metal valves and cocks. The samples in this display are representative of the product of the Western Tube Company, and while not comprising everything that is made by them are exponent of the completeness and care with which their product is treated. In order to exhibit samples of all the differently finished materials in the different sizes, too great a space would be necessary. The idea of this exhibit is to show the public that which is in most general use, rather than to weary them with a vast amount of material. The pipe display, while showing nearly all of the different products of that line, is comprised mostly of square and rectangular pipe. Special attention should be attracted by this display for the reason of the many forms in common use it has begun to take. Agriculture has become more or less dependent upon labor-saving implements and devices, and without the agricultural pipe the manufacturer of these implements would be at a sad loss. Structural work of other kinds is now formed with the greatest aid of rectangular and square pipe. Beyond the common interest in its utility it should have especial interest as a novelty. The Western Tube Company are sole manufacturers of this pipe.

As in the reception room, the furniture here is of mahogany, large, comfortable chairs and settles, and friends who wish to be at ease will find comfort, and if they desire to do any correspondence will be furnished with special Pan-American stationary. A representative of the Western Tube Company will always be at the exhibit, and will be glad to look after the comforts and needs of the public, to whom a hearty welcome is extended.

The samples in display representative of the Western Tube Company were prepared under the supervision of Mr. J. D. Purdy, Jr.

The booth and decorations and furnishings, designed by Carl E. Nash and constructed under his direction.

The electrical construction was under the charge of Mr. A. Barney.

The above are all regularly in the employ of the company.

THE BASHLIN CO.

Near the center of the valve section is shown, in various forms and styles, a valve which, while comparatively new to the trade, bids fair to become a formidable competitor to the older and better known makes. The Bashlin Co., of Warren, Pa., manufacturers of the Bashlin valve, frankly state in the introduction to their catalogue that they do not expect to compete in price with other goods used for the same purpose, but when it comes to grade of material, perfection of contsurction, smooth and effective working qualities and durability, they claim to produce a valve practically without a superior and more than worth the difference in cost over most other goods made for similar purposes. One of the strong points claimed for the "Bashlin" is that all its working parts are renewable and interchangeable. This gives it a vast advantage both in point of economy and in saving of time and trouble, as the disc and ring seat can be changed in a few moments of time; in fact, the latter can be renewed while the valve is under full pressure.

An interesting feature of the exhibit is the display of brass oil cups which have advantageous features peculiar to themselves.

THE MERRELL MFG. CO.

Pipe threading and pipe cutting machines, in a variety of styles and sizes, are shown in block 42 by the Merrell Mfg. Co., of Toledo. One of their leading productions is the "Apex" nipple and pipe mill machine, which will thread nipples, thread to thread, of all sizes within the range of the machine. They have added four or five new features in the past year, and are at present adding others, making the machine much stronger and simpler. The Apex is made in three sizes.

Combined hand and power pipe threading and cutting machines are made in four sizes, and they also manufacture four sizes of portable hand machines. In all these the gears are completely protected from dust, and another valuable feature is that none of them have an arbitrary lead screw for determining the style or pitch of thread to be cut. The whole line has been greatly improved as to strength and simpler methods of operation. R. W. Keilholtz is in charge of the exhibit. A full line of these goods is carried at the store of the Fairbanks Co., at 210 and 212 Main street, Buffalo.

VINCENT VALVE CO.
SWEET & DOYLE, SALES AGENTS.

In Section 46, which might appropriately be designated as "Valve Row," the Vincent Valve Co., of Sandusky, O., together with their selling agents for the United States, Sweet & Doyle, of Cohoes, N. Y., present a display of the Vincent adjustable wedge gate valves and their Big Four globe valve, a new one for high pressure. The Vincent gate valves are of the double parallel gate style, and have a straightaway passage full size of pipe. From the standpoint of durability and economy this is considered to be the simplest style of gate valve made. The Vincent valves are

made in sizes from ½ inch upward, for any kind of liquid materials, as well as gases. The "adjustable wedge" performs the all-important duty of seating the gates. It has an abundance of strength, less points of bearing, and less friction than any other wedge valve on the market. It is adjustable to the duty it has to perform, and by the peculiar position of the stern nut, it is released with but a fractional turn of the stem, and with the minimum amount of resistance.

The Big Four globe valve is put forth to fill the growing demand for a satisfactory valve for high pressure steam work, being guaranteed to stand 250 lbs. working steam pressure. Reliability, rather than price, is the main consideration. The display is superintended by W. D. Blaicher.

AMERICAN DISTRICT STEAM CO.

One of the main features of the exhibit of the American District Steam Co., of Lockport, N. Y., in Section 34, is an arrangement showing their system of underground mains for distributing steam in cities for the purposes of heating and power. This is displayed under the supervision of H. J. Babcock. This company makes a large number of steam specialties, many of which are shown here, including expansion joints, steam traps, steam meters, condensation meters, valves, angle joints and reducing valves.

KENNEDY VALVE MFG. CO.

One of the most complete exhibitions in Section 46 is that of the Kennedy Valve Mfg. Co., directed by George Stearns. They show an extensive line of flanges, and their gate valves are made in all sizes from ¼-inch to 72 inches. They have an excellent assortment of globe and angle radiator valves, with renewable, compressible discs. Another feature is the variety of hydrants and water works valves. A specialty which has met with great favor is Kennedy's patent fire indicator valve, and the same may be said of the Kennedy patent valve indicator post.

ROSS VALVE CO.

J. C. Ross, of the Ross Valve Co., Troy, N. Y., shows in their division of Section 46 a positive variety of the productions of that company. In fact, they make nearly everything in the steam and water regulating line. The Ross water engines are known far and near and the Ross regulating valves for steam, water and air are conceded to be of standard excellence. They make a feed water filter for land and marine boilers that has points of especial merit. They show one of their engines connected up and operating an automatic Aeolian Orchestrelle. Other specialties are tuning cones for tuning pipe organs, and the "Gem" ice cream spoon.

PITTSBURG METER CO.

Meters for bath, water and gas are shown in profuse but well ordered variety by the Pittsburg Meter Co., of East Pittsburg, Pa., in Section 25. Not only here are the productions of this company to be seen but their meters, gas and water, are used throughout the grounds by the Pan-American Exposition Co. One of their best and most widely known products is the Keystone Water Meter, which is a model of efficiency and accuracy. Fish traps are used on all the larger sizes of water meters. The Westinghouse proportional gas meter will measure and register from 30,000 to 100,000 feet per hour. Five or six of these are in use on the exposition grounds, one a very large one through which 100,000 cubic feet of gas pass per hour. Among the different varieties made by the Pittsburg Meter Co. are Westinghouse gas meters, Westinghouse proportional gas meters, Westinghouse water meters, Pittsburg disc water meters, Keystone water meters, Westinghouse gas pressure regulators and automatic safety cut-off valves, regulators for natural gas and Whysall boiler burners. This display is ably looked after by W. A. Holmes.

LAMB & RITCHIE.

In a cozy corner of section 25 J. E. Kimball, representing Lamb & Ritchie, of Cambridgeport, Mass., is always ready to explain to visitors the merits and advantages of their tin-lined and lead-lined iron pipe and fittings. This form of pipe is not made by mere coating or drawing through of the lining, but is a fusion of iron and tin, a substantial block tin pipe melted into a wrought iron pipe. While melted, the tin is poured into, and inseparably united to the iron and formed into a substantial inner pipe. The lead-lined pipe is made in the same manner. In both cases the result is one solid pipe, composed of two metals which cannot be torn apart. This last assertion is proven by the exhibition of a spiral sample showing the absoluteness of the union. In point of cost it is cheaper than brass pipe and it is indorsed by the best architects in the country.

THE WM. POWELL CO.

A fine display of valves for high and low pressure is shown by the Wm. Powell Co., of Cincinnati, in section 46. Two comparatively new specialties are Powell's patent "Titan" throttle valve and the "Giant" throttle valve. An article of deserved popularity is Powell's "Signal" oiler for dynamo engines, and they also make a variety of brass fittings for dynamo engines. The Wm. Powell Co. exhibit certificates of awards from the Centennial Exposition of 1876, and the Cincinnati Industrial Exposition for regrinding globe valves and plumbers' brass and plated ware. A World's Fair diploma in recognition of William Powell's inventive genius is also shown. The varieties of plumbing goods made by this company is almost too numerous to mention, but among others may be noted plumbers' ground key work, patent guard stops, S. & W. cocks, rubber plugs and stoppers, interchangeable handles, etc. Their department at the exposition is in charge of A. C. Macrae.

AMERICAN STEAM GAUGE & VALVE MFG. CO.

One of the best showings in 46, the valve section, is made by the American Steam Gauge and Valve Mfg. Co., of Boston. This company are the original manufacturers of steam gauges, having been established in 1850. They make all kinds of pressure gauges, steam, water, ammonia and pop safety valves, and underwriter water relief valves. Their American Thompson improved indicators, which are the only genuine Thompson indicators, received the highest award at the Paris exposition. They also show a line of small brass goods, revolution counters and clocks for engine rooms; also indicators filled with electrical attachments. This very handsome display is conducted by H. A. Crocker.

KIELEY & MUELLER.

Steam specialties in interesting and comprehensive variety are exhibited in Section 46 by Kieley & Mueller, of New York. They manufacture a number of patented articles in that line which are recognized wherever known to be of sterling worth. One of their latest and most ingenious productions is the Kieley & Mueller expansion steam trap, the movement of which is so marked that the expansion can be easily seen when standing at a considerable distance from the apparatus. The Kieley & Mueller Climax damper regulator is one of the most sensitive, accurate and effective things of that kind on the market. Among their other leaders in the steam goods line are the Kieley Standard steam trap, Kieley strainer connection, Kieley Special '98 reducing valve, Mueller steam trap, K. & M. No. 2 Champion return steam trap, Kieley's patent No. 2 positive acting pump governor, and Kieley's cantilever expansion steam trap.

WALWORTH MFG. CO.

The Walworth Mfg. Co., of Boston, in their exhibit in Section 31, which is in the capable hands of C. W. Gordon, show what is said to be the largest gate valve ever put on exhibition in this way, being of the 42-inch size. In the Van Stone joint for high pressure power plant work, they have succeeded in rivetting the flange onto another piece of pipe, which is considered a remarkable achievement. They carry a very complete line of high pressure and standard weight valves and fittings. A unique effect is produced by three pieces of power plant work set up of bent wrought iron pipes and extra heavy fittings. A full line of engineers' tools is shown, together with waterwork supplies, gun metal castings for 2,000-lbs. pressure, and steam whistles from 10-inch down.

THE WARNER & SWASEY CO.

Brass working machinery in the form of turret lathes, screw machines, etc., forms the basis of the display of the Warner & Swasey Co., of Cleveland, in Block 42. The machine to which E. P. Burrell, their representative calls particular attention, is their Hollow Hexagon turret lathe, especially designed for making duplicate machine parts, with a high degree of accuracy and at a minimum cost. Bars from ½ inch to 2 inches in diameter can be fed through the automatic chuck and turned any length up to 24 inches. Another machine shown is a 30 inch vertical turret machine for boring work and turning out other large work of a similar nature. Still another is a manufacturing miller No. 2 for milling work.

BUFFALO METER CO.

In a prominent corner location in Section 25, the Buffalo Meter Co. presents an extensive and handsomely gotten up array of their American and Niagara water meters. They also show a new water meter testing rig with new percentage scales, in which the percentage of error in testing a meter is read directly from the scale beam without figuring, and weighs in cubic feet and hundredths of a foot, on the basis that 62½ lbs. make one cubic foot of water. A taking effect is produced by a complete assortment of meter parts displayed in a handsome show case. The exhibit includes a variety of meter indicators registering in cubic feet United States gallons, Imperial gallons, used in Canada and other British possessions, and cubic metre dials, used in French, Russian, German and Spanish dependencies and Spanish-American countries. Japan also uses cubic metres. A number of other accessories in the meter and water appliance line are shown, such as curb boxes, meters with extension dials, meter lock boxes, meter curb boxes, etc. The display is in charge of Dayton Vogt.

HICKMAN-MELHORN CO.

W. E. Melhorn, of the Hickman-Melhorn Co., Pittsburg, manufacturers of combination vise and pipe threading machinery, displays in Section 34 a number of styles and sizes of their machines, principally for hand power. They call attention to the fact that their machines are light, durable, powerful and easy of

operation. By use of the "worm gear" a minimum amount of friction and wear is secured, and a more steady and powerful movement obtained than by other movements. This allows the cutting of all sizes of pipe at a single cut, which means a great saving in time and labor.

Lightness and compactness, combined with durability and strength—they can be used in confined places, and are especially adapted to trenches and line pipe work. A perfect thread can be cut, in any position, without moving, or bringing any strain on any point other than the one being operated on.

The lead screw makes starting easy, and causes less risk of breaking the dies, while the long bushings insure absolutely true line threads.

No. 1 machine threads ¼-in., ⅜-in., ½-in., ¾-in. and 1-in. pipe, using solid dies, 2½-in. by ¾-in. The capacity of No. 2, from 1-in. to 2-in, cutting four sizes right hand, with one set of dies. On No. 3, two sets of dies and two graduations and cutters are used. It cuts off and threads, right hand or left hand, sizes from 2½ to 4 inch. No. 4 is for pipe from 4 to 6 inches in diameter.

JENKINS BROS.

Jenkins Bros.' space in Section 46, presided over by V. D. Mahony, is one of the most attractive on "Valve Street." It is situated near the west end of the row, equipped with a neat railing and gate, the arrangement of the goods inside being tasty and effective. Two 20-inch valves stand eight feet above the floor. Among others are a piston back pressure valve, a by-pass globe valve and an indicator gate valve. A feature of the exhibit that appeals to practical minds is that the valves have not been dipped and the quality of the metal has excited much favorable comment. The dipping process often covers up defects in the material or the casting, but here the quality of the metal is at once apparent to the practical eye. A large variety of pump valves for all uses is also shown. They also exhibit the Graber indicating automatic water gauge, adapted for stationary, marine and locomotive boilers, separators, traps, tanks, and all places where gauges are used. Another feature is a very complete line of rubber goods, including Jenkins' famous "'96" packing.

SHERWOOD MFG. CO.

Engine and boiler supplies of all kinds constitute the main feature of the exhibit of the Sherwood Mfg. Co., of Buffalo, in the hands of H. M. Cary. This company are brass founders and finishers, and their tastefully arranged display comprehends about everything in the line of injectors, lubricators, oil cups, oil pumps, grease cups, etc. The business of the Sherwood Co. extends all over the country, and they have an extensive trade in Central and South America. They are distributing very effective advertising matter in the form of a series of blotters printed in English and Spanish and containing finely executed portraits of prominent American actors and actresses.

ATLAS PIPE WRENCH CO.

Steamfitters and all who are interested in wrenches for piping are viewing with interest and profit the display of the Atlas Pipe Wrench Co., of New York and San Francisco, in Section 34. This exhibit, which is in the care of L. W. Johnson, demonstrates the distinctive features and unquestioned merits of their 10-in., 18-in., 24-in. and 36-in. wrenches. The movable jaw can be set at will in any one of three slots, adapting it to the different sizes of pipe to be manipulated. Slot No. 1 is for the small, No. 2 for the medium, and No. 3 for the large sizes. It is easily seen that the teeth grip the pipe at an angle, and the gripping point is in advance of the handle, showing that in screwing the pipe you are pushing it ahead, and that you do not dig into the pipe and drag it as is the case with many other wrenches; therefore, you do not crush it. For the same reason the Atlas pipe wrench cannot lock on the pipe, as the fact that the gripping point is in advance of the handle makes that impossible. The movable jaw is not a screw jaw and has no weak parts. There are no nuts on the wrench to jam, and no delicate parts to get out of order or break. In short, it combines in an unusual degree the merits of strength, durability, simplicity and effectiveness.

TRIMONT MFG. CO.

"The 'Trimo' Tools" is the title of a handy little price list which visitors can procure on application to George Stearns at the Trimont Mfg. Co.'s space, in Section 46. The widely and favorably known "Trimo" pipe wrench is here shown in all of its eight different sizes.

This wrench is drop forged from bar steel, is interchangeable in all its parts, and has no wooden handle to break. Does not lock upon the pipe, but releases its hold readily. Grips the pipe firmly without lost motion. Does not crush the pipe nor slip. The movable jaw and the nut are made with a round top and bottom thread, guaranteed not to strip or burr. An inserted jaw is placed in the handle, which can be renewed for little expense when dull or worn.

The Trimo chain pipe wrench is made in five sizes. It has a solid head, provided on its upper side with three slots or grooves to admit and hold the projecting pins on the chain, giving six bearing surfaces. To the head is attached a forged steel jaw, having a rocking movement, enabling it to grip firmly without slipping, and to release its hold readily from the pipe. The chain by this means can be easily placed, and quickly removed, at the will of the operator.

Among the points of superiority claimed for this wrench are the following: Impossible to lock upon the pipe; the strain evenly distributed, each part bearing its proportion. An almost complete circular grip; works equally well whether pulling up or down; does not crush the pipe nor slip; will handle close fittings and work in closer quarters than any other chain wrench made.

Other tools shown of the Trimo brand are the 6-in. Trimo with screw driver and gas tip cleaner for gasfitters' use; the Bull Dog wrench; Giant pipe wrench; combination wrench for nuts and pipes; basin wrench; brass and nickel pipe wrench; the Trimo special narrow jaw wrench, and the "Trimo" pipe cutter.

BUFFALO FORGE CO.

One of the most prominent features of the manufacturers' building is the exhibit of the Buffalo Forge Co., Section 12, directed by T. M. Girdler. A striking effect is produced by a stack of steel plate heating and ventilating fans, beginning with a 150-inch fan with direct connected vertical engine on top, and with three more steel plate fans diminishing in size as they approach the roof, all belted to bottom fan and all running at the same time. "B" volume blowers and exhausters are placed on the edges of the steel plate fans. In one corner is a model heating and ventilating apparatus installed, consisting of heater sections connected to a steel plate fan with direct attached engine, the top of the fan being joined to a number of branches of galvanized iron pipe showing how the air can be distributed through buildings. Next to this is a No. 11 steel pressure blower, of the kind used in forge and foundry work. Numerous smaller blowers and fans are arranged about the space. This exhibit is placed where the roof of the building is highest and the space all the way up is utilized, the display being surmounted by the figures of two women standing on columns above a large painting of the company's works, and supporting aloft a globe representing the earth, with the name "Buffalo Forge Co." across its center. One of the most celebrated productions of the Buffalo Forge Co. is their down-draft forge of the heavy type, such as is used in leading railway and large industrial shops all over the country. Besides the two engines which run the fans, they show two automatic high-speed steam engines, one of horizontal and one of portable forges, punches, shears, bar cutvertical type, also numbers of small ters and drills. This company has also the following plants in operation on the exposition grounds: A 400-horse-power horizontal tandem compound engine, connected to a generator in power service building; two induced draft fans with direct attached engines at work in boiler plant of the power service building; heating, ventilating and air-washing apparatus in New York State building; steel plate fans and cooling transformers in Electricity building; biograph views of model forge shop in Government building; one of their large fans in "A Trip to the Moon," which furnishes the wind and makes them think they are going at a wonderful speed.

POWERS REGULATOR CO.

In Section 11, at the southwest corner of the Machinery Building, the Powers Regulator Co., of Chicago, show workings of their device for controlling the temperature of residences, schools, public buildings and railway cars. This apparatus, which is known as the Powers Heat Regulator, is warranted to maintain an even temperature and the claim is made that it will effect a saving of 25 per cent in fuel. It can be easily attached to any furnace, old or new, hot air, steam or hot water. It is put out under an absolute guarantee for five years. This company is doing a large business, based strictly upon the merit of their goods. N. B. Hall is their Pan-American representative.

AMERICAN BLOWER CO.

One of the most interesting things in Section 26 of the Machinery Building is a working model of the Moist Air Dry Kiln made by the American Blower Co. of Detroit, through J. F. Esperon, their representative. This is a long structure intended for drying and seasoning lumber and other things of that kind. The material passes through the dryer on pressed steel trucks which move on an iron track. Whenever one truck is taken out dried, a fresh one is run in at the other, or starting end, thus the dry kiln is kept continuously full. The mechanical draft is furnished by their "A B C" steel plate fans, and the circulation, being longitudinal, is thorough and effective. Their fans for mechanical draft, ventilation, and hot blast heating are made in sizes of all the way from 50 inches to 360 inches. One shown in their exhibit is a 140-inch blower fan. In the same space is shown the Morehead traps, which are the invention of John Morehead, the manufacturer of steam traps and beer pumps, at 707 Brooklyn Ave., Detroit. The return trap delivers the condensation direct to the boiler; the tank trap discharges into a drain or open tank, the condensation being returned to boiler by a pump or injector.

J. B. & J. M. Cornell.

Poole's patent pressure blowers and exhausters, in a number of varieties and sizes, manufactured by J. B. & J. M. Cornell of New York, are exhibited in Section 11 of the Machinery Building, by G. W. Poole, the inventor. It is said that their construction is such that they will produce greater volume and higher pressure with less horse power than any other type, in fact they claim to effect a saving on horse power of 25 per cent. The blower wheel is covered by special patent and the bearings are the best in use—the only ones of the kind used for blowers. A double spider, of the same shape as the wheel, fastened on each side of the fan wheel, adds strength, steadiness and reliability.

J. B. & J. M. Cornell make all kinds of iron work for buildings, machinery of every description, special machinery, heavy and light castings, steel filing cases, steel furniture, and burglar-proof vaults.

The Trenton Potteries Co.

A gem of sanitary art is the department of the Trenton Potteries Co., in Section J. J. of the Manufactures and Liberal Arts Building. A complete bath room, fitted up in novel style and tiled throughout in delicate tints, is furnished with a new design, Persian shaped tub, of solid porcelain, set in the tiled floor. The shower bath has a solid porcelain receptor, richly nickeled shower, and all modern improvements and accessories. The improved square lavatory is porcelain throughout, including the back, the supports, etc. The fireproof syphon jet closet with white enameled seat and crockery tank, is of the kind specially designed for use in fireproof buildings. Over tub and lavatory are handsome plate glass mirrors framed in green and white tile to the hand-painted tiling on dome and ceiling. The bath room is completely furnished with all necessary appliances. Their outer exhibit is made up of the latest designs of lavatories, sinks, laundry tubs, bath tubs and other solid porcelain goods. Also a line of handsomely decorated closets, with low down tanks, connected with water supply and in practical working order, and a nice line of decorated basins. At one end of their space they have a black velvet stand on which is displayed a full line of their toilet ware, jardinieres, vases, pedestals and umbrella stands. This array of artistic pottery is a delight to the eye and gives visitors some idea of the fine work in the decorating line done by this company. A pretty effect is made by the firm name "The Trenton Potteries Co." set in letters of gold tile in the white tiling of the wall. Robert M. Fielder is the representative in charge of the exhibit.

Standard Sanitary Mfg. Co.

At the corner of Section J. J., fronting on two main avenues of the building of Manufacture and Liberal Arts is the sumptuous exhibit of the Standard Sanitary Mfg. Co. They show five of their famous enameled bath tubs, of different patterns: the Albion, Monarch, Elysian, Luxuria and Hygeia. Seven closets are shown, six of them connected with water, and a handsome enameled lavatory. Partially separated from the outer portion of the space by a polished brass rail and rich draperies is a beautiful bath room with Albion tub, with shower over the tub, sitz bath, elegant onyx lavatory, and Ducal syphon jet closet with low-down mahogany tank. The bathroom is finished in tile with light blue tinted ceiling and handsome windows of unique design, made by the Willett Stained Glass Co., of Pittsburg. The display portion of the booth contains an enameled plate 998 receptor with nickel plated shower and fittings and china ball feet. They also show their enameled sectional double lavatories with six bowls, nicely set off by mirrors. In this part of the exhibit are six closets, two of them having the new medicine chest attachment and enameled iron syphon jet bowls. Another feature is laundry trays and factory wash sinks. The display is set off in white enamel, trimmed with gold on a background of green in imitation of nature. Rugs, flowers, etc., assist in giving a homelike air to the surroundings. P. F. Kimball, who is the presiding genius of this luxurious display, is always at home to visitors.

The J. L. Mott Iron Works.

A "modern model bath room" is the chief feature of the exhibit of the J. L. Mott Iron Works in the center of Section J. J., Manufactures Building. The general effect is superb and nothing is lacking to make it all that the above title implies. The Victorian solid porcelain tub, quality "A," is surmounted by a silver plated shower with green silk curtain. The supply fittings are silver plated, with unique waste and china handles. The tub is supplied with Imperial porcelain bath seats with silver plated fittings. Adjoining is a solid porcelain seat tub with handsomely plated trimmings. A thing of beauty is the Imperial porcelain Victorian lavatory on French pedestal, as is also the Imperial porcelain toilet table with full length cheval gass and silver plated standards. The closet is of the "Silentis" pattern with Manhattan seat and cover finished in celluvarno white, the flush and supply fixtures being richly silver plated. The bath scale is of white enamel with silver plated measuring rod. The bath room is finished in white tile and gold border, the floor being of extra glazed white tile. Outside of the bath room proper is an elaborate combination shower and needle bath with Imperial porcelain receptor and rich green silk curtain. The lobby, from which the bath room is separated by maroon curtains, is done in green tile set off by red and gold and mirrors framed in white enamel. The floor is a gem of mosiac art. All the tubs and porcelain ware are decorated with beads and three gold lines or bands. All of the tiles used in the exhibit are manufactured by the American Encaustic Tiling Co. of Janesville, Ohio, whose goods are used exclusively by the Mott company. The display is efficiently and courteously superintended by W. J. Mooney.

A. L. Swett Iron Works.

Near the center of the Manufacturers' Pergola, in Section G., the A. L. Swett Iron Works of Medina, N. Y., manufacturers of hot water heaters and plumbers' special goods, show several sizes of their Robbin hot water heater which possesses a number of distinctive features, one in especial, that no other heater has, being that the water, entering below at the fire box, continually ascends, there being absolutely no horizontal or downward direction to the flow. The greatest possible fire surface is presented, the water rising through the water jackets, columns and the four separate coils which occupy the central space. The water after having performed its duty returns to the bottom of the heater and is used again, and so on continuously. The coal occupies the outer space and completely surrounds the combustion chamber, protecting and holding in the heat. The coal being at the sides and feeding into the fire over the rim of the fire pot, leaves the center clear and never interfers with the combustion. The heater is supplied with sensitive dampers which control in such a way that the use of a thermostat is superfluous. It is doubtful if any heater made will maintain as even a temperature with as little attention. There are five sizes, Nos. 12a, 12, 14, 16 and 20, the numbers corresponding with the width in inches of the fire pot. They range from 250 feet to 1,000 feet radiation.

This company manufactures a large and various line of cast iron sinks, adjustable sink brackets and legs, cellar and sewer traps, cess pools, sidewalk, manhole and catch basin grates, solder pots, etc. A catalogue of these goods and also a handsome descriptive catalogue of the Robbins hot water heaters may be had by mail on application. A. L. Swett, president of the company, and Frederick Robbin, inventor of the heater, are giving the display their personal attention.

Holophane Glass Co.

Of all the interesting things in the Electricity Building, one of the prettiest and most attractive is the display of the Holophane Glass Co., of New York, in Section O. Here in all their brilliancy are shown the many forms of the Holophane Globe for the various forms of gas and electric light. This is the only prism that will so spread the light that the whole of the globe is luminous. It produces a softened light superior to that of ground or opalescent glass. The globes direct the rays in proper directions, practically increasing the illumination. Some throw most of the light downward, as over a desk or table, some around a wider space as from a chandelier in a room, and some direct the rays some distance away from the light, as on streets. Other globes which soften light absorb from 15 to 75 per cent of the light, but the Holophane, while softening, increases the light. The Holophane globes are in use on the exposition grounds in the Acetylene Building and the Ohio State Building. Other prominent structures in which they have lately been put in use are the large Baer Building at Reading, Penn., the N. Y. Yacht Club Building, University Club, New York City, and the Elks Temple at Spokane Falls, Wash. E. L. Elliott, general superintendent of the company, directs the exhibit.

Iron Clad Mfg. Co.

An unusually attractive display is that of the Iron Clad Mfg. Co. of New York, in Section O. O., of the Manufactures and Liberal Arts Building. They make an impressive showing of their line of Iron Clad range boilers, expansion tanks, boiler stands and gas and gasoline water heaters. They also present an attractive array of Iron Clad steel enameled sinks, sink backs, sink brackets and sink sundries together with the Iron Clad corrugated and galvanized pipe straps. Also an extensive line of their famous enameled kitchen ware and utensils. Genial H. C. Cochrane, who has charge of the exhibit, is distributing a neat souvenir in the shape of an enameled ash tray.

The Bruce-Cram Generator Co.

The Bruce Hydro-Pneumatic generator shown by W. C. Pratt, general agent for the Bruce-Cram Generator Co., of Brooklyn, N. Y., near the southwest corner of the Acetylene Building, differs in many important points from any other gas machine on the market. There are no sliding gasometers to stick and thus vary the pressure, no water seals to blow out or become foul, and it is absolutely odorless in operation. The material is the

best galvanized steel, especial care being taken with the riveting, pipe fitting and other points of workmanship and construction. In addition to strength and durability the Bruce generator has the merit of compactness, requiring less space than other machines of similar capacity.

The carbide is contained in a subdivided tray with seven compartments made to hold from one to three pounds each. The water flows into pocket No. 1 until it is completely flooded, then runs over the partition and down the side of pocket No. 2, attacking the carbide from the bottom of the charge. The water feed, which is on the hydro-pneumatic principle, is covered by special patent. The regulator maintains at all times an even pressure of gas at the burners, insuring a steady flame. The commercial carbide which is used in this machine contains one-half to one cubic foot more gas per pound than the fine carbide used in other machines, a strong, economical feature. The cost of each 30-candle power light is about one-third of a cent per hour. Two pressures of gas are supplied with the same machine, one for lighting and the other a heavy pressure that will operate a Bunsen burner or blow pipe, adapting it for light or heavy soldering.

THE SUNLIGHT GAS MACHINE CO.

In the center of the Acetylene Building the Sunlight Gas Machine Co., of New York, give a demonstration of the workings of the "Submarine" acetylene gas machine, under direction of W. E. Scofield, M. E., the inventor of this generator. This is designated as a distinctly high-grade gas plant, which extracts every particle of the gas from calcium carbide, cools and purifies it, and stores it for use when needed. The carbide is placed in capsules entirely disconnected from the machine proper, and hung at the orifice of the generator ready to be precipitated therein when the gas tank needs replenishing. The capsules being always in view, it is easy to see when recharging is necessary without opening any part of the machine, thus precluding the possibility of the escape of gas. The quantity of carbide in the capsules is so regulated as to just fill the gas bell, causing a saving of the gas, which would otherwise be lost in the "blow-off." This is an important point, as every 500 cubic feet of gas so wasted through overproduction means the loss of 100 pounds of carbide. The Sunlight people show their faith in the merits of the "Submarine" by offering it on thirty days' trial to responsible parties. They will be pleased to send on application illustrated catalogue and treatise on acetylene gas.

THE KINNEAR MFG. CO.

The Martindale automatic acetylene gas generator, made by the Kinnear Mfg. Co., of Warren, Pa., and exhibited by their superintendent, G. H. Chipman, operates by the precipitation of fixed charges of carbide into a large body of water. The carbide is placed in buckets of the necessary size and capacity, which are automatically dropped as needed, by a simple mechanical device. The gas is made only as fast as it is consumed, according to the number of lights in use. The only attention the machine requires is renewing the charge of carbide which takes little more time than filling a lamp. A simple but sure mechanical indicator shows at all times the number of unused buckets of carbide. Every particle of gas in the carbide is immediately stored for consumption in the gasometer, thereby obviating the necessity for exhaust and waste pipes. A cotton filter and a water purifier are used insuring cool generation and clean gas.

The Franklin Institute, of Philadelphia, has awarded to the manufacturers of this machine the highest honor that has been granted by them to any acetylene generator, namely, a diploma and medal, and it is receiving honorable mention in various scientific reports. The Kinnear Co. also manufactures the Martindale self-measuring oil tank.

AMERICAN ACETYLENE BURNER CO.

A gem of neatness and beauty by day and a spectacle of clear, pure brilliancy at night is the space occupied by the American Acetylene Burner Co. of Hoosick Falls, N. Y. Here are shown the different varieties of the Shaffer patent burners for acetylene gas, including the Shaffer Gem burner, with solid lava tip, the Shaffer Champion burner with all lava tip, the Shaffer Queen burner with solid round tip and the Shaffer Multiple burner, made in two, three, four and five-flame burners. Among the many advantages presented by these goods may be mentioned their lasting qualities, their thin though brilliant flame which economizes in gas, and the fact that the entrance and discharge passages are at right angles to each other, securing an even flow of gas with no blowing, no smoking and no carbonizing. The Gem and Champion burners, being all lava, an absolutely rigid substance, the flame cannot become twisted. The Queen burner is made with lava tips set in sockets reamed out of solid brass, making it equally rigid. All these are made in sizes ¼, ½, ¾ and one foot, and are perfectly uniform in consumption of gas. The display is directed by H. E. Shaffer, president of the company and inventor of the burners, and Walter A. Wood, Jr., the secretary.

PAN-AMERICAN ACETYLENE CO.

On of the prettiest booths in the Acetylene Building is that of the Pan-American Acetylene Co., of Buffalo, which occupies the northwest corner to the right on entering. It is tastefully finished in pale blue with gold lettering and decorations, harmonizing in effect with the showing made of their Northlight and Colonial generators. A distinctive feature of these machines is that they operate without a single valve, cock, spring, pulley, cog-wheel or like mechanism. The Northlight "A" is what is known as a clean surface generator, its automatic, non-mechanical working depending on an admirable balance between gas and water pressure. The carbide is put into the holder, resting on the patented, pointed grate. Water poured into the outer space finds its way by natural pressure, upwards into the bell, rising slowly until it reaches the carbide, when slacking and the consequent generation of gas immediately begins.

The Northlight "B" generator operates on the carbide feed plan but, like the Northlight "A," extracts and delivers at the burners every atom of gas held by the carbide. The carbide used is one-quarter inch size, fed in such a way that every particle is slacked, leaving no lumps and consequently allowing no waste.

The Colonial generator is also constructed on the carbide feed principle, and while sold at a lower price than the Northlight, is accompanied by a guarantee of efficiency, reliability and durability. In connection with this exhibit is a display exemplifying the merits of Puratylene, the great purifier for acetylene gas, manufactured by the Roessler & Hasslacher Chemical Co., of New York and Chicago.

THE STATE LINE MFG. CO.

"Steward's Wonder Burner" in letters of pure white acetylene flame is the device above the display of the State Line Mfg. Co. of Chattanooga, Tenn. This was the first acetylene sign ever made, this company being the first to manufacture acetylene gas tips from lava.

Near the front of the space is a long tube or burner bar on which are ranged fifteen different styles of their burners. These, together with the illuminated sign above, present a striking effect at night. In a handsome double bent glass show case is displayed a complete line of burners and tips in the original packages, together with samples of the steatite or lava from which the tips are made. One of their latest productions is D. M. Steward's patent "Meteor" burner which is a good reliable article, at a reasonable prices, made in the standard sizes. They also show a collection of medals which have been awarded them from time to time in recognition of the excellence of their goods. The exhibit is under the capable direction of R. B. Steward.

IN BUSINESS SINCE 1859.

The Weathered boilers for steam and hot water heating are the subject of a green book published by Thos. W. Weathered's Sons, 46 & 48 Marion street, New York. They make boilers of the improved sectional and dome types, which are said to be very powerful, considering the amount of fuel consumed. The firm has been established since 1859.

RIGHT TO THE POINT.

The International Sprinkler Company, of Philadelphia, Pa., of which Clarke Merchant, of Merchant & Company, Inc., is president, sends us a forceful dispatch card setting forth the advantages of their system of fire protection both as regards efficiency and cost of installation. Their arguments are backed up with a list of factories in which their apparatus is used and by a couple of very strong testimonials from satisfied customers.

DOING MISSIONARY WORK.

The International Heater Company, Utica, N. Y., take the reader of their latest booklet into their confidence and frankly tell him that it is their purpose to interest him first in acetylene gas, the ideal illuminant, and afterwards show up some of the good points of the Drake "Special" Generator. They profess their willingness to do a little missionary work—would rather have him buy some other machine than not to use acetylene. But they advise him not to buy a cheap one. The booklet is full of pointed paragraphs, and should convert the most skeptical. It will be sent on application, mentioning "Domestic Engineering."

AMERICAN MANUFACTURES ABROAD.

The increase in export trade of American manufactures during the past two years has been something enormous, and we are glad to see that the Rider-Ericsson Engine Co., of New York, Chicago, Boston and Philadelphia, are getting their full share of it. No week passes without shipments of Rider and Ericsson engines to all parts of the world. A recent shipment of six engines to Spain would seem to indicate that our late unpleasantness with that country had been the means of teaching that American machinery was a good investment. The Rider-Ericsson people are the successors of the famous Delamater Iron Works and Rider Engine Co., and a line to any of their stores will bring full information to those desiring it regarding their valuable pumping engines.

Sixth Annual Convention of the Canadian Master Plumbers Association at Toronto, June 26-28, 1901.

N the morning of June 26th the beautiful city of Toronto opened its gates to the sixth annual convention of the Master Plumbers, Gas, Steam and Hot Water Fitters of the Dominion of Canada. Old Sol was out in all his glory but the warmth he poured forth was very insignificant to that of the welcome of the reception committee as they received the visiting members at their headquarters, the Iroquois Hotel.

At 9:30 a. m., after the comforts of all the guests had been attended to, the executive committee met to arrange the order of business.

FIRST DAY'S SESSION.

At 2 p. m. the delegates assembled at the convention hall in the Temple Bldg. As the meeting was called to order by President Meredith, the following members were present:

Wm. Mansell, Toronto.
Jos. Lamarche, Montreal.
Jos. Pennington, Windsor.
F. Powers, Lunenberg, N. S.
J. H. Wilson, Toronto.
Thos. Moll, Montreal.
J. F. Christy, Montreal.
John Walson, Montreal.
Jos. A. Giroux, Montreal.
H. Knox, Ottawa.
F. G. Johnson, Ottawa.
John McKinley, Ottawa.
A. Fiddes, Toronto.
A. Purdy, Toronto.
H. Hogarth, Toronto.
J. H. Neelands, Barrie.
H. Mahoney, Guelph.
Peter Shields, Kincardina.
Messrs. Bull and Williams, St. Thomas.
C. Wright, Petrolea.
Mr. Boxall, Lindsay.
M. B. Squire, Winsor.
W. J. McGuire, Allison.
J. B. Fitzsimons, Allison.
Adam Clark, Hamilton.
Messrs. Rogers and Wallace, Hamilton.

The president reported an improvement in the relations between the members of the association and the manufacturers and jobbers, but room remains for further advance along that line, the gentlemen engaged in those lines of business not yet having grasped the aims and objects of the association. He renews the complaints of over-keenness on the part of masters to obtain work which causes some to underbid and to resort to rather questionable methods in order to get work and instead of blaming the manufacturers and jobbers for not accompilishing greater success the president advised members to turn the searchlight upon themselves to see whether the defects are not to be found there. As a means of obtaining a more perfect organization which shall embrace all the master plumbers in the towns and villages the suggestion is offered that the secretary be allowed some remuneration for his services in order that he may be able to devote his time to organizing the trade. The state of the trade generally is regarded as satisfactory.

After the president's address the reception committee of the Toronto council, in behalf of Toronto, extended the freedom of the city. President Meredith responded in a happy manner, after which J. H. Wilson, president of the Toronto local association, welcomed the delegates. After this followed the reports of officers, presentation of credentials and other general business. After which the convention adjourned till 8 p. m.

At the evening session the time was occupied in a discussion upon the reports of various officers, which were ultimately referred to a special committee. The Committee on Apprenticeship reported, in reference to the terms which apprentices are required to serve. The Legislative Committee reported upon the laws enacted by the different Provinces in connection with sanitary matters. The committee, which has been working for the past two years upon a scheme for Provincial organization, was granted an extension of time. After hearing the reports of the committees the session adjourned.

SECOND DAY'S SESSION.

Thursday, at 9:30 a. m., the second day's session opened with the reading of the minutes of the previous day's session, which were confirmed.

Owing to the fact that the reports of various committees were not completed, Pres. Meredith requested Jos. Lamarche, of Montreal, to address the meeting. Mr. Lamarche responded with a very interesting talk on Montreal's plumbing ordinance, which is one of the finest on the continent. An extended debate followed on the advisability of establishing a provincial association, after which it was decided to take up the constitution, clause by clause. The advisability of employing a paid secretary to transact the business of the National Association was taken under consideration. An extended discussion followed, which resulted in carrying the matter over till the Friday session.

THE CARRIAGE RIDE.

At 2 p. m., in response to an invitation from the city of Toronto, the delegates assembled at the Iroquois Hotel to participate in a carriage ride around the city. The party was driven through Toronto's beautiful residence districts with their fine lawns and shrubbery. All points of interest were pointed out, particularly the parks, city hall, school buildings, parliament building and many fine churches.

Owing to the heat of the day it became necessary to make several stops at some of Toronto's club houses, during which time the party became very much indebted to Mr. A. A. McMichael, of the Jas. Robertson Co., for his hospitality.

After a very pleasant afternoon and with a very kindly feeling towards the city of Toronto for their entertainment, the party returned to the hotel for supper.

THE BANQUET.

At 8 p. m. a surprise awaited the delegation in the way of a banquet at McConkey's, prepared for them by a joint committee, composed of the Toronto Supply Association and the Toronto Master Plumbers' Association.

To appreciate the tone of the occasion one has but to glance at the

MENU.

Consomme Princesse.
Lettuce. Radishes. Olives.
Restigouche Salmon Joinville.
Pomme Parisienne.
Cannelon of Sweetbread. Tomato Sauce.
Green Peas.
Spring Lamb. Green Mint.
Potato Natural.
Individual Ices. Wafers. Fingers.
Assorted Fancy Cakes. Meringues.
Fruits of the Season.
Black Coffee.

During this delightful repast music was furnished by local talent, while the finest sparkling wines and ales were served to the parched company.

After the refreshments had been served Mr. J. H. Williams, president of the Toronto Association, took the chair.

After duly honoring "The King," Messrs. A. E. Kemp and Edward Gurney responded to the combined toasts of "Our Country" and "The Manufacturing Interests."

Messrs. W. H. Meredith, of Toronto, Alderman Lamarche, of Montreal, and F. Powers, of Lunenburg, N. S., respondto to the toast "Our Guests, the National Association." Mayor Howland of Toronto, Alderman Cox, Alderman Woods, Alderman Loudon, to the toast, "The Mayor and Corporation." Messrs. Patterson, Fleming, Taylor, Morrison, Alcock and Anthes, to the "Manufacturing and Supply Trade." Messrs. Ross, McKitrick and McMullin, to the "Local Master Plumbers." T. Christie, T. A. Russell, R. Harris, to the "Sister Associations." Messrs. Edmonds and Keeney, to "The Press," and Capt. Giroux of Montreal, John Watson and Mr. Allen toasted "The Ladies."

The touching event of the banquet was the presentation of a ring by Toronto Master Plumbers' Association to their old and honored member, Mr. Alex. Fiddes of Fiddes & Hogarth. During the banquet Wm. H. Meredith, president of the National Association, requested Mr. Fiddes to come to the chair, and spoke a few fitting words of the association's gratitude to Mr. Fiddes for his many years of faithful service to the association as the founder, treasurer, financial backer and councillor. At the close of his address Mr. Meredith requested Mr. Alex. Purdy, Mr. Fiddes' old apprentice, to place the ring on Mr. Fiddes' finger. Mr. Fiddes was deeply touched but responded as follows with words which came direct from the heart:

"Mr. President, I am taken back, so much, by your kindness that I am so confused that I do not know what to say. I am so overcome by your kind words that I really do not know in what manner to thank you, but, of course, thank you I must, no matter what the manner, for cold, indeed, must the heart be wherein there is no response to kind words. Kind words are flowers on the wayside of our journey through life. They sweeten what is sometimes the bitter cup. I will feel with fondness your kind gift and, if possible, kinder words all the the days of my life. I am getting into the sere and yellow leaf now, but to enjoy your kindness I hope to live many days yet in this grand old world. For it is a grand old world, and I love it, and would be loth to leave it. I love it as a longing child loves its mother when hungering for an embrace to her loving breast. I love it with its sunshine and its flowers, with its waters and its mountains, with its plains covered with lifegiving grains, and the existence on it of that grand old something we call Love, and the fellowship of man with its sympathies, such as are harping sweetly on the chords of my heart at the present moment. I am sorry I am not an eloquent man for I would like to be able to thank you for this expression of fine feeling in a fitting fashion, but from the bottom of my heart, in my own simple way, friends, I thank you."

It was in the small hours of the morning when the jolly crowd dispersed and there was no one leaving the hall that night that did not know that every other fellow was a good fellow.

THIRD DAY'S SESSION.

Friday at 9:30 a. m. the last day's session was called to order by President Meredith.

Several telegrams of regret were read from members unable to be present after which came the reports of various committees. Messrs. Powers, Pennington and Watson, a committee appointed to estimate the cost of holding the next convention at Halifax, reported that the maximum for seven delegates, including transportation, meals and sleeping accommodations, would be $315. While the cost of printing and reporting would amount to $125. The committee were under the impression that railroad expenses could be reduced.

The discussion as to the advisability of having a paid secretary occupied a considerable time. A motion was made and carried which authorized the secretary to employ an assistant whenever he saw fit.

The grievance committeee was next heard from, after which the following motion was made and carried:

The Dominion Supply Association shall be asked to furnish a quarterly list of supply houses in sympathy with the association, which shall be endorsed by the president and secretary of the National association. The secretary of each provincial association shall be asked to furnish each supply house the list of master plumbers in good standing at the last regular meeting. No member shall be furnished who shall refuse to pay sight draft for arrears in dues.

Each provincial association shall assess and collect such quarterly dues as shall be required for general expenses, including per capita tax to National association. Dues shall be paid in advance quarterly and it shall be the duty of the treasurer to make sight drafts (with exchange) on all members three months in arrears at the regular time of meeting. Members refusing to pay such drafts shall be suspended and dealt with at the next regular meeting.

A committee was appointed to draft new clauses for the constitution which would permit of provincial associations, and to revise the existing clauses in the constitution so that they would correspond. This special committee is to submit the revised constitution to the executive committee for final endorsement.

It was decided by unanimous vote to hold the next convention in Halifax.

The following officers were elected for the ensuing year:

President, John McKinley, Ottawa; vice-president, F. Powers, Lunenberg, N. S.; secretary, H. A. Knox, Ottawa; treasurer, Jos. Lamarcne, Montreal.

VICE-PRESIDENTS.

For Ontario, Wm. Mansell, Toronto; for Quebec, John Watson, Montreal; for Nova Scotia, G. A. Ferrier, Halifax; for New Brunswick, Jas. Walker, St. John; for British Columbia, J. H. Wilson, Toronto; for Manitoba, Jos. A. Giroux, Montreal.

A vote of thanks was extended to the retiring president, secretary and treasurer for the faithful manner in which they had performed their duties.

A vote of thanks was also extended to the city of Toronto for its hospitality, to the local master plumbers, manufacturers and jobbers of Toronto, and to the press, particularly the trade press. After singing Auld Lang Syne the convention adjourned.

At 3 p. m. the master plumbers, by the special consent of the Lieutenant-Governor of Ontario, had a group photograph on the elegant lawns of the governor's home.

THE TROLLEY RIDE.

At 4 p. m. the party enjoyed a delightful trolley ride around the city and out to Long Branch, where dinner was served.

During the afternoon a ball game was played by the manufacturers' association vs. the plumbers' association, which resulted in a victory for the former by a score of 4 to 3.

A dance and musical in the pavilion followed the dinner, which was thoroughly enjoyed by all. The ladies present were: Mesdames Purdy, Kirkpatrick, Newman, J. P. Beal, Mason, W. Williams, Matthews, Meredith, Wilson, Allison, Squire, Windsor, Ont.; Piddington, Toronto; McCullah, Robinson, Bates, Sellais, Gowan, Shaw, Currie, House, Alderman Woods, Misses Fiddler, Little, Crofton, Wilson, Ada Williams, M. Williams, E. Hogarth, Spence, F. A. Mansell, M. Mansell.

Among the manufacturers and jobbers present were the following: Dominion Radiator Co., Adam Taylor, R. J. Cluff, Harry R. Flett, W. W. Taylor, Geo. A. Allen, J. S. Taylor; Toronto Foundry Co., H. W. Anthones; Gurney Foundry Co., T. B. Alcock, T. J. Taylor, E. J. Brewer, W. L. Helliwell; Jas. Robertson Co., W. S. Jackson, S. Topping, E. A. Rogers, J. Foster, W. H. Sheppard; Ontario Lead & Wire Co., Fred Somerville, W. C. Allen, W. J. Spence, C. W. Chandler, R. A. Somerville, J. Matthews, A. Fleming; Stevens Mfg. Co., London, T. A. Stevens; Goodrich Organ Co., Aleck Saunders; Jas. Morrison Brass Mfg. Co., Chas. E. Morrison, Robt. Morrison, Chas. World, Chas. Britton, Arthur Betton; F. W. Webb Mfg. Co., W. P. Baxter.

The press was represented by Messrs. Lew Edmonds, of the Canadian Hardware Reporter, and F. P. Keeney, of Domestic Engineering.

At the conclusion of the last dance the merry gathering sang God Save the King and thus marked the ending of the 6th annual convention of the Canadian master plumbers.

Convention Notes.

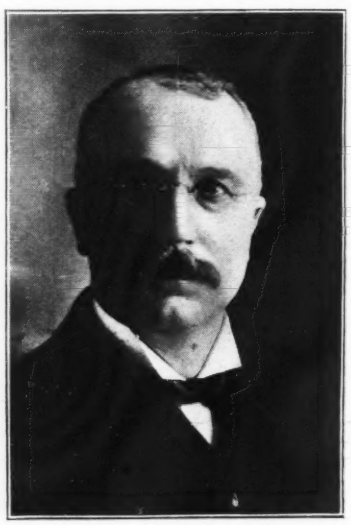
W. P. Baxter, of Montreal, manager of the F. W. Webb Mfg. Co., was present during the entire convention. This firm opened their Montreal branch only in May, but are already full up with business.

Those who had the pleasure of meeting Mr. W. L. Helliwell, of the Gurney Foundry Co., will not soon forget his genial smile. Mr. Helliwell has recently spent three years in South Africa in the engineering corps.

F. W. Armstrong, of the James Morrison Mfg. Co., was very much in evidence during the convention. Mr. Armstrong has a large circle of friends in the retail trade.

George A. Wooten, of the G. A. Wooten Co., Halifax, arrived in Toronto Friday, the 28th.

The trade are very much indebted to Mr. F. Edmonds, of the Canadian Hard-



Frank Powers, Lunenburg, N. S.

ware Reporter, for his attention during the entire convention. Mr. Edmunds is connected with one of the most progressive journals in Canada.

"Domestic Engineering's" representative is indebted to Mr. Taylor, of the Dominion Radiator Co., for an invitation to visit their plant, and he regrets that owing to lack of time he was unable to do so. Mr. Taylor states that they have one of the largest radiator plants in the world, and are the originators of some familiar types of radiation which are almost universally used.

Darling Safety Pipe Tongs.

The Darling Pump and Manufacturing Company, of Williamsport, Pa., are putting on the market a pipe tongs which they call the Darling Safety, and which, they claim, will not crush the pipe. Their circular says the Safety accomplishes its work with one handle and one jaw. The bit (which has four cutting edges each of which can be dulled before a new bit is required), can be instantly removed or inserted.

No screws to break or threads to strip in fastening bit in place.

Grips the pipe firmly and will not slip.

A good serviceable tool, and, as it "will not crush the pipe," of especial value for use around wells, or pipe lines, or where it is desirable to preserve the internal diameter of the pipe.

Greater New York

Office: 89-91 Centre Street Tel. Franklin 1680

ELMER CRAWFORD, Manager. Frank P. Turner, Edwin L. McCulloch } Representatives

A "Way-Up-Town" Plumber.

J. F. Reilly, 250 Brook avenue, is one of the "way-up-town" plumbers who is busy now. There is considerable jobbing work on hand, he says.

Mr. McDermott On Police Stations.

M. J. McDermott, Tremont avenue, is doing plumbing on new police stations at Tremont and High Bridge. He reports several other good jobs.

New Force Pump Company.

The Field Force Company, of Lockport, has been incorporated, with a capital of $50,000. Directors are W. S. Chapman, C. A. Barnes and Laura B. Chapman, Lockport.

Pacific Bank Building Plumbing.

The plumbing in the Pacific Bank building, 542 Broadway, will be thoroughly overhauled. Meyer-Sniffen fixtures will be put in. W. Y. Jack & Co. will do the work.

Mr. Solomon's Fine Stable.

The new private stable of B. L. Solomon's, on 85th street and Park avenue, is said to be one of the finest stables in New York. The plumbing work was done by John Tucker.

A New Disinfectant.

The Bakterol Company, New Brighton, Staten Island, are pushing a new antiseptic, deodorant and disinfectant, which they have named Bacillol. Circulars will be furnished upon application.

Mr. Gayner Getting His Share.

T. F. Gaynor seems to be getting his share of up-town work. He has work in several apartment houses at 100th street and West End avenue and other jobs as good in the up-town district.

Will Make Toilet Paper.

Doty & Scrimgeour are a new corporation that will manufacture toilet paper and paper materials. Their capital is $150,000, and Ethan A. Doty, W. S. Doty and J. H. Scrimgeour, Brooklyn, are the incorporators.

Rosenbluth & Dowling's Good Job.

The elevator apartment house on Boston avenue, near 167th street, will have only best of plumbing in it. Rosenbluth & Dowling, 1744 Lexington avenue, have the job. They also have a number of other good jobs on hand.

George V. Ellis Moves.

George V. Ellis, who is known for the "Ellis" system of marine plumbing and "Ellis" automatic sewerage lift, has moved to 39 West 32d street, where he has very pleasant quarters and will be glad to welcome the trade.

A Plumbing Plum.

The George A. Fuller Company, the large builders, will erect the new Frick office building in Pittsburg. A number of firms were after the plumbing contract, which involved over $100,000. Weldon & Kelly, Pittsburg, received it.

Prepared to Furnish Price Lists.

The Colwell Lead Company, 63 Center street, are prepared to furnish upon application a copy of the United States standard price-list on seamless drawn lead traps and bends, which went into effect June 3.

A Pencil Traveler.

"The John Simmons Company, plumbers', steam and hot water fitters' supplies, etc., New York City," is on a lead pencil that is finding its way all over the world.

New Settlement House Plumbing.

The plumbing work of the new West Side Settlement House, 50th street and 10th avenue, will be done by Callun & Oliver, 405 West 51st street.

Stroh & Huber's Big Contract.

The plumbing contract for the nine-story extension to Riesenweber's Hotel, 58th street and 8th avenue, has been let to Stroh & Huber, 438 West 51st street.

Mr. Barry's Big Job.

Among other large jobs James B. Barry, 1976 Lexington avenue, is doing the plumbing for a ten-story apartment house on 45th street.

Mr. Hosford's Force Busy.

L. D. Hosford, the well-known plumber, 68 Beekman street, seems to find plenty of work for his large force of journeymen. A number of new contracts are reported.

Gives Up One Shop.

Joseph Hamilton no longer has a shop on 10th avenue, but is doing all his work at his shop at 165th street and Edgecombe avenue. He has several large contracts on hand.

Blotters for the Asking.

John A. Murray, manufacturer of the Haggerty solder pot, is getting out a very neat blotter, on which is a cut of the "Haggerty." His address is 625-627 6th avenue.

Closets, Hoppers, Traps, Etc.

A card will bring to any part of the world a booklet telling all about closets, hoppers, cess pools, traps, etc., manufactured by the Monitor Iron Works, 76-80 Center street.

Mutual Life Building's Plumbing.

Thep lumbing of the annex of the Mutual Life Insurance building, Nassau street, will be of the best. Thomas Swain, 129 West 17th street, has the contract.

Henry Huber Company Busy.

The factory of the Henry Huber Company at 136th street and 3rd avenue, is working full handed to keep up with orders. There seems to be a good demand for their plumbers' supplies.

Engel & McMahon, New Firm.

The plumbing business formerly conducted at 28 St. Mark's place by the late F. Ehrhart, is now controlled by Engel & McMahon. Mr. McMahon formerly had a shop at 117 3rd avenue. Both members of the new firm at one time worked for Mr. Ehrhart.

Who Wants One?

George Callahan & Co., 218 Front street, who deal in plumbers' specialties, tinners' and roofers' sundries, etc., are giving out large sized blotting sheets, which are very convenient.

Mention "Domestic Engineering" when asking for them.

Mr. Staats Makes Improvements.

Gus Staats, 160 East 59th street, has completed certain improvements to his shop that doubles the attractiveness of it. Among other things is a show window, in which he will arrange a nice display.

Souvenir Pocket Book.

Those fortunate enough to get one of the leather pocket books the Standard Steam Specialty Company, 111 5th avenue, gave away at the steam and hot water fitters' convention at Niagara Falls say the souvenir is one of the neatest and best out.

Mr. Jaynes Takes Charge.

C. A. Jaynes, formerly of Jaynes & Blagden and who was for years buyer for the N. O. Nelson Manufacturing Company, St. Louis, Mo., has assumed charge of the office recently opened at 220 Broadway by the Bellmark Pottery Company, Trenton, N. J.

Bronx Local Association.

M. J. McDermott, 717 Tremont avenue, and J. V. McEvily, Tremont and Arthur avenues, are getting the Bronx plumbers in line for a local association. The former is temporary chairman and the latter is secretary. The movement thus far has been very successful.

Miller's Falls Co.'s Catalogue.

The Miller's Falls Co., 28 Warren street, have a catalogue in course of construction. It will not be ready short of a month, however. The Miller's Falls Co. makes a line of hand drill presses, etc., that are particularly useful to plumbers and mechanics in general.

Evory Mfg. Co.'s Catalogue.

The Evory Manufacturing Company, 102 John street, will be ready in a few days to supply the trade with catalogues and circulars of "Evory" specialties for plumbers, steam fitters, etc. The book is now in the printer's hands and ought to be ready for almost immediate delivery.

Have Opened New Warehouse.

The Pierce, Butler & Pierce Manufacturing Company, 46 East 20th street, have opened a new warehouse at 622-624 West 36th street, which they have stocked with boilers, radiators, air valves, steam specialties, etc., so as to enable them to make prompt delivery on orders.

J. Marching & Co's. Good Report.

J. Marsching & Co., 27 Park place, report a run on their thorium and other mantle chemicals. This company is one of the best known manufacturers in the world of such chemicals, and no mistake can be made by patronizing them.

Messrs. Kohlman and Manes, their western salesmen, will arrive in New York July 1 for a several weeks' vacation.

Of Interest to Plumbers et al.

Among the literature of interest to plumbers will be found an illustrated price list of seamless wrought steel sinks and plumbers' bowls, enameled ware, agate nickel-steel ware, which is coming from Lalance & Grosjean Manufacturing Co., whose large factory at Woodhaven, L. I., is running full handed.

Metropolitan Supply Co.

The Metropolitan Supply Co., plumbers' supplies, 2505 3rd avenue, report business as being very good.

The Metropolitan company handles the Collins improved pipe hanger, which is adjustable without being removed from pipe. They are in a position to furnish any quantity of these hangers at reasonable prices.

White's Plumbers' Tool Bags.

Ira F. White & Son, 76 and 78 Park place, are supplying the trade with illustrated price-lists of their plumbers' tool bags. These bags are made of best carpet, are canvas lined, have leather bottoms and sides and flaps are leather bound. Material and workmanship are of the best. A line will bring one of these price-lists to any part of the world.

Locke & Smith's Pocket Edition.

A pocket edition of plumbers' force pumps, cocks, fittings, gas proving pumps, etc., is being issued by C. S. Locke & Smith, 103-105 West 37th street. The little book is complete as well as being of very convenient size. It contains illustrations and condensed information of the articles listed, which will be appreciated by the man whose "time is money."

Mr. Heiland's Price List.

George W. Heiland, steam and plumbing specialties, 101 Beekman street, is issuing an illustrated price list that will be convenient for plumbers to have.

Among other specialties handled by Mr. Heiland are the N. R. pipe cover and N. R. saddle T and Y, which are manufactured by Charles Weissberg, jobber of plumbing and gas fitting supplies, 47 Sheriff street.

N. Y. Steam Heating Co.'s Fight.

The ground occupied by the New York Steam Heating Company, on East River between 59th and 60th streets, is needed for one of the piers of the proposed Blackwell's Island bridge and the corporation counsel has been asked by Bridge Commissioner Shea to institute condemnatory proceedings to acquire the property. It is said that the New York company will oppose the action, claiming that it is a semi-public corporation.

Gave Away 10,000.

The J. L. Mott Iron Works, 84 to 90 Beekman street, have given away 10,000 of their maps of the United States and their supply is now reduced to an even dozen.

The map was of best workmanship and makes a very useful article for an office or store.

The Mott company's postage stamp bill for sending out these maps was no small item, being between $400 and $500.

McMan & Taylor's Catalogue.

A catalogue of plumbers' supplies, etc., which McMan & Taylor, 104 John street, have been working on for several months and which they expected to have ready for distribution last month, will not be ready until the latter part of July.

Some illustrations and matter which they were to get in time to get their book out on schedule time failed to materialize when called for.

Pleased With Success.

W. S. Newkirk, manager of the Eastern business of the United States Heater Company, 129 Worth street, is pleased with the success given him on his last trip out of town, which took in the steam and hot water fitters' convention at Niagara Falls. "When you have a good thing all you have to do is to get it before the people. Then you can put in the rest of your time filling orders," is what Manager Newkirk says.

An Attractive Fixture.

There is a handsome combination gas and electric light fixture on exhibition in the show window of Shapiro & Aronson, 67 Centre street. The fixture is a large one, taking up the entire window, and is of beautiful workmanship. It attracts much attention from passers-by and many stop to look at it.

Shapiro & Aronson have good facilities for manufacturing gas and electric fixtures. Their factory is at 213-215 Centre street.

Mr. Torpie Succeeds Mr. Pfeiffer.

The business of the late Charles Pfeiffer, 3878 5th avenue, who died April 7 last, has passed into the hands of J. Martin Torpie. Mr. Torpie is known to the trade and has things so arranged that he can compete with any. He is an old-time plumber and knows the business from start to finish.

Match Holder Free.

The Rochester Lamp Company, 38 Park place, are supplying their friends with a unique match holder. A young man of large proportions is pictured gazing seaward. The rear of his trousers are loose and upon being touched open, showing a small package of matches. And then there is a small square of sand paper upon which to light the matches.

A Handy Tool.

New York gas fitters are getting acquainted with a very handy tool, which is being placed on the market by the Trimont Manufacturing Company, Roxbury, Mass. The tool is the narrow-jaw Trimo wrench, with a screw driver in the end of each. The screw driver is forced in or out by a thumb screw. The tool is particularly designed for work in close quarters.

Something Good in Sight.

The Kern Incandescent Light Co., 18 Murray street, are anxiously looking forward to the time they can supply demands for their new catalogue. They have been working on the book for several months and would have it ready for delivery now if some cuts had not been delayed. The book is to be up-to-date in every way when completed, which will not be for a month or so yet.

A. B. & C. Co. Report Healthy Growth.

The American Brass & Copper Company, 243 Canal street, report a healthy growth in business. They are doing now over 25 per cent more than they did at this time last year and business is still steadily on the increase. It has been necessary all during this year to add to their force as well as to increase their room and manufacturing facilities.

National Company's New Sink.

The plumbing trade are fast learning the merits of a new line of seamless wrought steel sinks, which are being placed on the market by the National Enameling & Stamping Company, 81 and 83 Fulton street. They are drawn from a single sheet of heavy steel. The bottom is made tapering to the waste outlet, giving good drainage. A line will bring a catalogue. Mention "Domestic Engineering."

Good Company's First Catalogue.

The Good Manufacturing Company, brass and rubber specialties for plumbers, etc., 132 Brook avenue, are now ready to fill demands for their 1901-2 catalogue, which, judging from advance sheets of it, will be one of the best catalogues sent to the trade this year. It is their first catalogue and they have set a fast pace for their competitors to follow in the catalogue line.

The cuts are of the best workmanship in New York City and the paper is correspondingly good. They are expecting a heavy demand for the book, but have arranged to give all requests immediate attention.

Standard Plumbing Supply Co.

R. F. Seiffert, of the Standard Plumbing Supply Co., 156th street and Brook avenue, reports that his company is very busy. They make a specialty of slate work and among other contracts they now have are those for the new fire house in Yonkers, large building for W. Y. Jack & Co., West 20th street, and large building for Habeck & Fajins, 132nd street, near Amsterdam avenue.

Business is much better than at this time last year, Mr. Seiffert says. The Standard company's telephone is 37 Melrose.

NEW YORK TIMES SAYS:

Nickel furniture for the bathroom is a delight, and small pieces can be bought one at a time and the cost is not noticed. There are towel hangers which never become soggy with wet towels, as the wooden ones are sure to do, and which can be wiped off without trouble, and are always fresh and clean. There are soap dishes and nickel cups secured to the wall, into which are set the toothbrush glasses, which cannot be knocked to the floor. Those glasses in which are placed a number of different brushes have nickel tops perforated into four or five holes, into which the brushes may be slipped and held apart.

PUT ON TRAVELING MEN.

The Good Manufacturing Company, 132 Brook avenue, manufacturers of brass and rubber goods, have found it necessary to again increase their traveling force. Thomas F. Fisher has been added to the list and will visit the trade in the New England States. Mr. Fisher is thoroughly familiar with the trade and is already finding many orders.

The Good company's new catalogue, which has been in course of preparation for some time, will be ready for delivery about July 5. A number of new articles and novelties of interest to the trade will be found in it.

WILL SOON BE READY.

The Colwell Lead Company, 63 Centre street, will have their new salesroom at Centre and Pearl streets stocked within a few weeks. Carpenters and painters have worked a wonderful transformation in the Colwell building in which the new salesroom is. The entire building has been painted.

The new storeroom, when completed, will be roomy, well lighted and well ventilated. The several large show windows will give the Colwell Company's window artist a good opportunity to show his ability.

A full line of bath tubs, closets and other "Colwell" goods will be on exhibition.

A VERY COMPLETE CATALOGUE.

Edward F. Keating, 446 to 454 Water street, is sending out a very complete catalogue of plumbing materials and steam, water, gas and oil supplies. Everything in these lines of consequence is given space. The book is filled with illustrations.

Mr. Keating has a large stock to draw from. His large warehouses at 435-439 Water street and 187-189 Cherry street, are well stocked with everything in these lines.

Either 918 or 919 Franklin will get him by 'phone. His cable address is Phoenicine.

A catalogue and prices will be promptly mailed upon application. Kindly mention "Domestic Engineering" when asking for either.

A NEW CATALOGUE.

Charles Millar & Son Co., one of the oldest manufacturers and dealers in plumbers', steam and gas fitters' supplies, etc., in the United States, are supplying the trade with their latest catalogue, which is one of the neatest catalogues that has reached this desk.

Supplies of every description for plumbers, water works, steam and gas fitters, contractors, engineers and mill owners, are given space, and everything is fully described and illustrated. The book is very compact and is a credit to J. D. Abraham, the well-known New York publisher, who compiled and published it.

Special attention is directed to the new and convenient arrangement for ordering. All illustrations are designated by letters, doing away entirely with letters under the cuts. All necessary in ordering is to give page number and letter under cut.

Every catalogue is accompanied by a pad of order blanks, which serve as a reminder that Charles Millar & Son Co. are waiting for an order.

POCKET CATALOGUE OF RUBBER GOODS.

The American Belting & Packing Company, 35 Warren street, are supplying the trade with a pocket edition of their high grade mechanical rubber goods, which is both complete and convenient.

Belting—rubber and leather—hose for all uses, packing, gaskets, rings, valves, valve balls, rubber springs, diaphragms, etc., are all specialties of the American company.

Their line of plumbers' rubber supplies is complete. Their "Boss" washers, fuller balls, water closet gaskets, sink and waste washers, rubber elbows and bathtub and basin plugs are guaranteed to give satisfaction.

They propose, they say, in pursuance of the prime principle of their business, to manufacture goods which shall be uniform in quality, and such as cannot be excelled in any requisite. They agree to meet all requirements of honest competition.

Their latest improved machinery and experienced workmen, and other facilities, allow them to make this statement. Their telephone number is 2504 Cortlandt.

OF INTEREST TO BATHERS.

The Nason Manufacturing Co., 71 Beekman street, have added Melchers' shower yoke to their list of "features" and are having quite a run on the article.

The yoke opens and is put on like a collar. The water is automatically shut off while the yoke is being put on or taken off. It wets the whole body at once. It is especially convenient for traveling men.

MELCHERS' SHOWER YOKE
ATTACHES TO ANY TUB OR LAVATORY
HEALTH, STRENGTH, BEAUTY,
STIMULATES THE ENTIRE SYSTEM TO HEALTHY ACTION
ASK YOUR PHYSICIAN ABOUT THE USE OF SHOWER BATHS.

The Meilink Manufacturing Co., Toledo, O., are the manufactures. The Nason Manufacturing Co. will supply all requests for catalogues. They will also upon receipt of a two cent stamp mail Shower Baths in Health and Sickness, a book of general practical utility, by Edward Melchers, A. B., M. D.

TWENTIETH CENTURY PRODUCTION.

A very handsome example of modern up-to-date catalogue making is the latest catalogue of the Joseph Dixon Crucible Company, Jersey City. It is a Twentieth Century production from cover to cover. The title page, which represents a workman, stripped to the waist, "pouring off," is a piece of work that is rare even in these days of handsome catalogues.

The center page shows the Dixon plants—the graphite works at Ticonderoga, and the main plants at Jersey City. Opposite the introductory page are other views of the graphite mines and cedar mills—Hague and Graphite, N. Y., and Crystal River, Fla.

Graphite is one of the most useful materials of commerce. The Joseph Dixon Crucible Company are the largest miners, refiners and manufacturers of graphite in the world, the founder having begun the manufacture of graphite crucibles and stove polish in 1827, nearly three-quarters of a century ago.

Several pages of this up-to-date book are given over to the world-famed Dixon pencil, which are favorably known wherever pencils are used.

This catalogue is well worth the asking for. Although it is just from the printer's hands the demand for it has been great.

STRIKES CAUSE MUCH TROUBLE.

W. E. Stokes, the millionaire builder and contractor, whose new apartment hotel at 74th street and the Boulevard had no sooner been delivered from a strike of bricklayers than it became involved in a complicated strike of plumbers and members of other trades have appealed to the Board of Walking Delegates.

It appears that the Roebling Construction Company, which is doing the metal lathing, has a contract with the metal Lathers' Union for the work. Members of the Sheet Iron Workers' Union got part of this work to do and the regular metal lathers struck. Then the plumbers, who are represented in the Board of Walking Delegates, quit work because steam fitters were doing work they wanted. The elevator constructors and other trades quit work in sympathy.

GET NEW FACTORY.

H. B. Olmstead & Co., pattern makers and manufacturers of plumbers' woodwork, 87 Frankfort street, have recently found it necessary because of the increased demand for their goods to lease a new factory. Their former factory at 31 Broadway, Brooklyn, was too small for them, and they have taken the four-story brick building at 663 Manhattan avenue, Brooklyn.

The new factory has been fitted up with the latest improved machinery and their facilities are almost doubled.

This firm calls especial attention to their pattern shop. They are now employing a large force of men on machinery patterns of many kinds, including automobile, electrical and valve work. Attention is also called to their drain boards, which are attracting considerable attention. Catalogue of plumbers' woodwork will be furnished upon application.

A TRADE REPORT.

Mr. Fifield, of McNab & Harlin Manufacturing Co., plumbers' and steam supplies, 56 John street, said this week that local business is not up to the standard. There is considerable out-of-town business, many orders being received daily from neighboring towns and cities.

Prices on steam cast brass and iron goods advanced June 1, which may explain why local trade in these lines is not better, he thinks. Buyers may be waiting for prices to drop. Labor troubles are to blame for some of the local falling off in trade.

A Greater New York Plumber.

William Doellner, the subject of this sketch, is a young man who in 10 years has worked up from shop boy to master plumber. He started in with G. O. Ellis, now the Ellis Marine Plumbing Co., soon became a helper, then junior plumber and then a full-fledged plumber.

Mr. Doellner has worked for such men as John McCullough, of 6th avenue; George A. Page, of Madison avenue; Thomas Hindley, of 6th avenue, and others. He assistetd in putting in the large tank at Madison Square Garden for the Naval show and worked on the Siegel, Cooper & Co. and other large New York jobs.

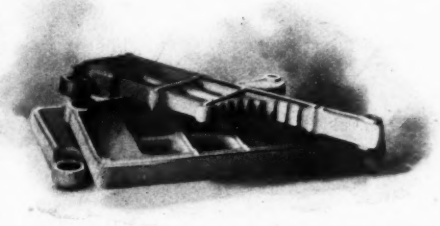
Wm. Doellner, New York City.

Mr. Doellner became a master plumber May 1, when he opened a salesroom and shop at 214 West End avenue. This is in a good neighborhood. His salesroom has a large show window, which contains a pretty display of closets, tubs, etc. He would be glad to receive catalogues and price lists from the supply trade.

Mott's New Boiler and Heater.

A new safety steam boiler and water heater that is attracting attention is Mott's New Series 3 sectional safety.

Series 3 is composed of sections made in two pieces, the larger weighing 350 pounds. The cut shows the half sections. Either piece can be taken through any ordinary door or window. A push nipple at the top and the same bolts that hold boiler together hold in place the halves of each section. The push nipple is five inches in diameter and there is a continuous five-inch header running length of



boiler inside. The section bolts are run through cored openings, which keeps them away from both fire and water and avoids danger of leaky joints due to expansion.

Heavy grates are used. Each bar is separate and can be easily and quickly removed. The ash pit is seventeen inches high, insuring, it is said, cool grates and perfect combustion and giving plenty of room in cleaning out ashes.

By using movable flue plates Series 3 is converted into a return flue tubular boiler, and when used with flue plates it is a water tube boiler.

The smoke flues formed in sections are 6x9 inches, large enough to burn any kind of flue-cleaning brush.

Returns with a Glowing Account.

Charles H. Simmons, treasurer of the Powhatan Brass & Iron Works, of Charlestown, W. Va., has returned to New York after a tour of inspection of the works. He reports business in fine shape and the works pushing out large orders of water, gas and steam goods, as well as brass goods of every description. John B. Brazier, manager of the works, is continuously getting out new patterns to cover the latest designs for their goods and the prospects of all the work they can handle is significant of the fact that proper management and the proper kind of goods will win every time.

New Contracting Company.

The J. Devlin Contracting Company has been incorporated. J. H. Devlin, Julia Devlin and Eugenia Devlin are the incorporators.

June Better Than May.

June was a better month for Judson A. Goodrich, plumbers' supplies, etc., 105 Beekman street, than was May. And it was also better than was June of 1900.

R. & J. Catalogue Coming.

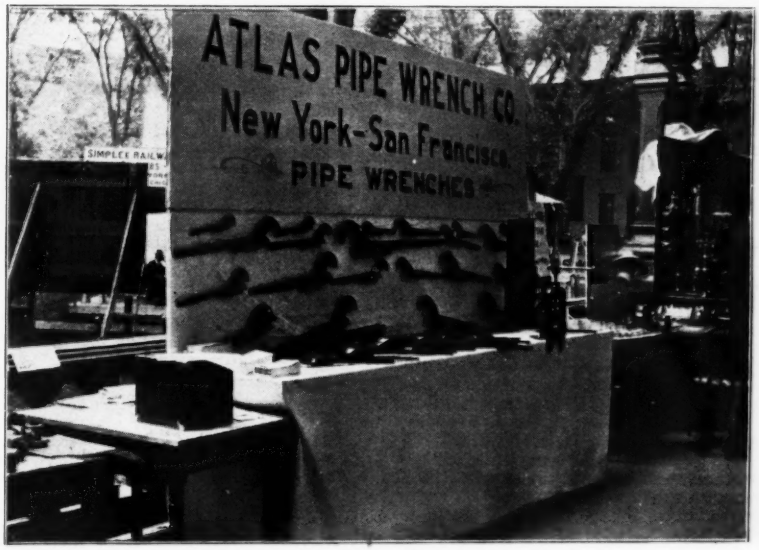
Ronalds & Johnson, plumbers' supplies, etc., 52 Cliff street, are still at work on their catalogue, but expect to have it ready for delivery within two or three weeks.

Saturday Closing Card Out.

The Imperial Rubber Company and the Imperial Steam Packing Company, 132 Liberty street, have their Saturday closing card out. They close at 1 o'clock on Saturdays.

Wickes' Pretty Store.

John C. Wickes, manufacturers' agent for plumbers' supplies, etc., who recently opened a store at 66 Beekman street, has



Atlas Pipe Wrench Co's. Exhibit at Master Mechanics and Car Builders Convention.

Dixon's July Calendar Blotters.

Dixon's Graphite Paint calendar blotters for July are ready for delivery. In order to get a supply of these useful articles it is best to get your order in early.

Imperial Packing Co.'s Catalogue.

The Imperial Steam Packing Co., 132 Liberty street, are busily engaged on a new catalogue, which ought to be ready for mailing within a month. They have some of their old catalogues on hand, but would rather fill catalogue requests with their new book. Mention "Domestic Engineering" when writing.

Mr. O'Brien Home Again.

John E. O'Brien, manager of the Eastern office of the Atlas Pipe Wrench Co., 121 Liberty street, is just home from the Master Mechanics' and Master Car Builders' convention, at Saratoga, N. Y. He reports an extra large attendance and a goodly number of excellent exhibits. His company had an exhibit of their pipe wrenches, which excited considerable comment among the railroad men.

a very pretty salesroom, which is well lighted and stocked.

Mr. Gilbert, Hustler.

William W. Gilbert is one of the hustlers who visit the plumbers supply and specialty people. Mr. Gilbert represents Morgan & Wright, of Chicago, who manufacture a good list of rubber specialties for plumbers.

Demand for Lead Pipe.

"Demand for lead pipe is not great," said Tatham Brothers, 82 Beekman street, this week, "and we don't look for any excitement yet awhile. Not for a month or so, anyway. Price has risen quarter of a cent."

Atlas Co.'s Pretty Souvenir.

One of the prettiest souvenirs that has reached this office is a match box being given away by the Atlas Pipe Wrench Co., manufacturers of the well-known Atlas wrench, 121 Liberty street, New York, Flood building, San Francisco, and New Haven, Conn.

Philadelphia Filter Work.

H. B. Olmstead & Co., pattern makers and manufacturers of plumbers' woodwork, 87 Frankfort street, have received a large order for patterns from the Eddy Valve Company, Waterford, N. Y. The latter company has a big contract for the filter which the city of Philadelphia is erecting, which requires many special valves. The Olmstead Company will make about fifty patterns for the Eddy Company, among which are patterns for 30-inch and 20-inch disk valves. It is a rush order and must be ready for delivery within four weeks. H. B. Olmstead & Co.'s facilities are especially adapted for good and rush work. Although they have only recently doubled their facilities, they are compelled to keep increasing their force in order to keep up with their orders.

Khotal Off to North Pole.

No one in New York will watch the movements of the Baldwin-Ziegler North Pole expedition with greater interest than the Hydrocarbon Burner Co., of 197 Fulton street. Evelyn B. Baldwin has left London for Dundee, where his ship "America" is ready to sail. The expedition goes first to Tromsoe, Norway, thence to the White Sea, where 400 Siberian dogs will be embarked. They will meet the auxiliary ship Fridtjof at Franz Josef Land. The start will be made from there July 12. On board the America is a large consignment of Khotal wickless oil burners, which will be used for cooking and other purposes in the far north. Although many makes of oil burners were offered Mr. Baldwin, he selected the Khotal because of its extreme simplicity and other excellent features. So if his expedition is successful the Khotal will be the first of its kind to reach the North Pole and the Hydrocarbon Company will accordingly be very happy, for the Khotal is "their's."

The Mail Was Twisted.

The real reason why the name of the Bell Manufacturing Co., 281 Water street, was changed to the E. C. Bell Manufacturing Co., is probably known to a very few. It came about this way:

As is known, the Bell Manufacturing Co. are large manufacturers of bath tubs, closets, etc., so when President E. C. Bell one morning found in his mail a request from a New Jersey druggist to immediately send by express a barrel of Huffy's whiskey, twelve pounds of paris green, a gross of Dood's sarsaparilla, and a lot of other things, the names of which he couldn't make out, he was very naturally surprised.

But he was even more surprised when on the next morning he received a letter that read something like this:

Bell Manufacturing Co, New York City:

Dear Sirs:—We desire to call your attention to our new "X" embalming fluid. This fluid will leave the corpse more lifelike than any other known embalming fluid. We will be glad to furnish you prices and testimonials upon application.

Yours truly, etc.

At first it looked as though some enterprising embalming fluid company were advertising their fluid on the "from maker to consumer; no middleman's profits" plan.

The embalming fluid letter was soon followed by a letter from some casket company, who claimed that their special $9.68 casket was giving great satisfaction wherever tried, and then Mr. Bell thought it about time to do something. An investigation showed that there were two other Bell Manufacturing Companies in New York, one a drug firm, the other undertakers. Investigation also proved that both the drug and undertaking firms were wondering why they were expected to fill orders for bath tubs, "H" automatic syphon cisterns, etc.

Miller Specialty Co's. Specialties.

The Greater New York department is in receipt of reading matter describing specialties manufactured by the Miller Specialty Company, North Tonawanda, N. Y. Among those mentioned is Miller's patent closet and urinal ventilator, of which Benjamin L. Rand, North Tonawanda, writes as follows:

"Geo. O. Miller, Esq., City:

"Dear Sir:—The closet ventilator you put in Bank Building works to perfection, and I believe it is a thing that should be generally used, and will be as soon as people find out its worth. It is worth a great deal more than its cost every month. We will be glad to show it to anyone who may be interested."

Their compression bibb is another specialty which will become better known. It is practically non-leakable and possesses merit. A removable seat is one of its features, and it is double-acting.

Miller's "Cling Fast" ceiling plate and Miller's water motor with an emery wheel and buffing wheel are probably as well known as the Miller Co's. other specialties. Both have special features.

Regarding this company's patented cellar drain and back pressure valve we will publish the following, which is taken from the Niagara Falls Gazette:

"At a regular meeting of the Board of Health last night the members looked into the merits of a newly patented cellar drain and back pressure valve. It is the invention of a Tonawanda man named Geo. O. Miller, and it met the approval of the board, who adopted a resolution recommending its use to all licensed plumbers.

"The valve is designed to prevent the flow of water into the cellar by reasons of a strong back pressure. It's mechanism is simple. A rubber ball floats in a trap and the arrangement is such that a flow of water into the cellar drain forces the ball into a receptacle made for it, thereby securely closing the aperture and preventing any water from getting into the cellar. The cost of the device is small."

The Glorious Fourth.

All of Greater New York celebrated the Fourth. There were no plumbers doing any business except patriotic business. The manufacturers shut down their factories and the jobbers closed their stores and everybody made a day of it. Some saw the sights at Coney Island, others took in the different excursions up the Hudson and the rest put in their time in various ways and places.

Jackson's July First Catalogue.

Edwin A. Jackson & Brother, 50 Beekman street, have just issued their 1901-2 catalogue of grates, ventilators, etc. It is dated July 1 and is strictly up-to-date.

The book has forty pages and the picture on the front page would be a beautiful one to frame if there was no reading matter on it. It is of a pretty girl seated before a grate, with no other light in the room save the light from the burning coals, in which she is trying to read her future. There are several new styles with special features described.

Mention Company Incorporates.

Papers of incorporation have been taken out by the D. J. Mention Company, to do a general contracting business. Capital is $5,000. Directors are D. J. Mention, Peter Simpson and Lizzie Mead, all of New York City.

Klein's Bankruptcy Petition.

Simon Klein, formerly a dealer in hardware, residing at 159 East 110th street, has filed a petition in bankruptcy, with liabilities of $1,132, and no assets. There are thirty-seven creditors. The liabilities were contracted in 1895 and 1896.

Business is Dull.

Estate of A. Froelich, Beekman and Pearl, say business is dull, but that this is their dull season. Their business will open about September for gas supplies, ranges, etc., at which time they will more than make up for their temporary dull spell now.

Still Behind in Orders.

Henry Stein, agent for the Milwaukee Brass Company, 48 Cliff street, says his company is still way behind in its orders; that it is working an extra force of men over hours in an effort to get caught up. Trade and prices are first rate, he says.

Mott's Encouraging Report.

J. L. Mott Iron Works, 84 to 90 Beekman street, had an encouraging report this week. There is an increased demand for their heating goods and the prospects are that the demand will steadily increase. There is considerable building going on and there is much figuring.

"Jenkins" Canes in Evidence.

A number of the swell walking sticks Jenkins Brothers, valves, packings, etc., 71 John street, have been giving away at recent conventions, are to be seen in New York streets. The cane is of bamboo, with a curved handle. It is the very latest thing out, say those who are carrying them.

P. B. & P.'s. New Booklet.

The Pierce, Butler & Pierce Manufacturing Company, of Syracuse, are supplying the trade with a neat little booklet telling of the good qualities of their make of closets. It is of good paper and got up in good style. They have branches at 46-8 East 20th street, New York; 50 Oliver street, Boston, and 24 South 7th street, Philadelphia. A line will bring you a booklet.

Time to Be Doing.

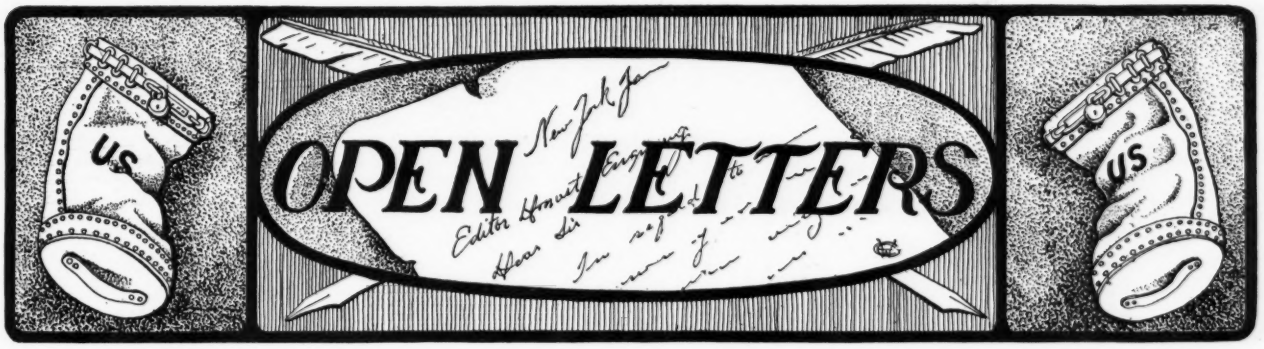
"The weather is too hot for the furnace trade," said Mr. Richie, of the Boynton Furnace Co., this week. Although business is improving slowly, according to Mr. Richie, in the furnace trade, it is dull right now. This is the time when building ought to be going on, and furnaces put in, as well as the time when furnaces should be put in good condition for winter, but, as in many other things, people are waiting until the last minute.

Plumbers Getting Busier.

Greater New York plumbers seem to be getting busier every day. While some say that they are not doing what they consider their share of work, a majority say their net profits exceed those of the first six months of 1900.

A number of large buildings are under way, which pleases those who make a specialty of new work, while those who make an effort for overhauling and jobbing work say there is lots of this kind of work. Many prefer jobbing to new work for several reasons, chief among which is that no large outlay of money is necessary, and, too, there is good profit in jobbing and overhauling work.

Plumbers in Greater New York are just fairly startetd now, it is said. But those in smaller towns in this vicinity have been quite active for several months, their work beginning earlier than their city brethren's for some reason.



View of a Danish Plumbing Shop.

Chicago, Ill. To the Editor of "Domestic Engineering": Sir—Having noticed with much interest the many fine views of the interior of plumbing stores, which you have printed from time to time in your valuable journal, I hereby take the liberty to send you a view of a heating and plumbing store in Copenhagen, Denmark, viz., that of Matthissen & Dittmann, Kjobmagergade 22. I do not send it to you, because I think it can compare very favorably with the perfect arrangement in the American plumbing stores, which most of the views, published in your paper, have shown, but rather because it gives one an idea about how far American enterprise also in this line is ahead of the European countries. The reason for this in the case of Denmark is, that there is very little demand for bath-tubs and water closets, etc., as such things are considered luxuries and used only by very few even among the upper classes. Steam and hot water heating is also used very little in Denmark, and such stoves (kakkeloone) as are standing along the walls in the store are the ones most commonly used, and in perhaps more than ninety out of a hundred cases peat is used as fuel for their heating.

A New System of Sewer Ventilation.

The following letter is self-explanatory:

To the Editor of "Domestic Engineering":

Sir:—Your letter. 18th inst., is received, requesting me to give you a not too technical description of my system of sewer ventilation and disinfection, as it may be of interest to the readers of "Domestic Engineering." Pertaining as it does to the sanitation of towns, and especially of large cities, the matter of eliminating foul gases from the sewers and preventing their emission into the atmosphere of the streets, and, more particularly, through drain pipes into the dwellings and business places of the people, is always a subject of vital import to the public.

My system is so simple that there is little scope for the use of technical terms. It consists simply in submerging the mouth of the sewer (an old device), closing the surface inlets with some form of trap which, while it prevents the admission of air, will admit the free inflow of liquids; and then providing at the surface end of each inlet conduit, or drain, a small fresh air inlet which will admit air into the said conduit either through its surface trap or at a point immediately below the trap.

A suction appliance connected with the sewer and causing a partial vacuum therein will induce a circulation into each of these fresh air inlets and through their respective conduits, flowing always from the surface inlets toward the main sewer, and thence through the sewer system to the suction appliance.

It is evident that while a circulation is maintained flowing from the surface inlet down into and through the conduit into the sewer, no gases can rise from the sewer and flow through said conduit or drain, in an opposite direction toward the building, or buildings, drained thereby. A very small fresh air inlet, located at the remote end of a drain, will supply air enough, under this system, to cause a circulation through said drain flowing always toward the main sewer.

Under this system it is possible also to combine or connect a number of separate sewer systems, by suitable air ducts, into a multiple sewer ventilating system, whereby a very large sewer mileage may be ventilated by a single operating plant under the care of one attendant on a watch, the only limitation being that the total area of the whole number of fresh air inlets (which in many instances may be as small as one-quarter inch in size) shall not exceed the area of the sewer system at its point of smallest diameter and, even this may be exceeded provided the power and speed of the suction appliance are proportionately increased.

Above all, the tempering of these minor fresh air currents by passing them first through the inlet conduits or drains, renders it possible to ventilate sewers, even in cold climates, without danger of freezing the sewage or liability of damage to the sewer itself.

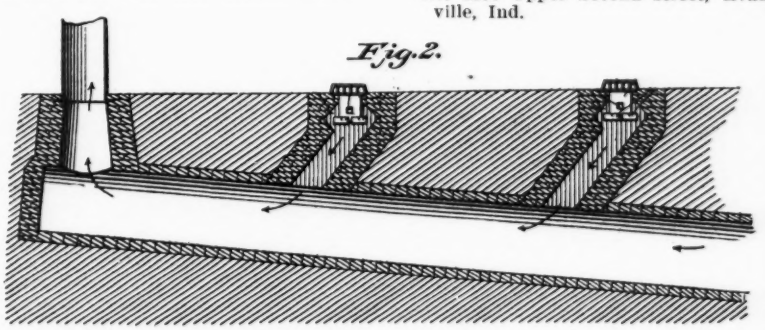
To enable you better to understand the system I enclose herewith a copy of U. S. Patent No. 67,074, which, in Fig. 2, illustrates the principle.

Yours truly,

Geo. P. Heilman.

No. 1100 Upper Second street, Evansville, Ind.

Fig. 2.



Bath Tubs for the Poor.

The Boston Journal has a correspondent who evidently discovered more uses for the bath tub than most people would think of. Her communication is reprinted here in the hope that if the arguments are firmly grasped by the talking member of the firm they will help promote the sale of tubs:

Dear Editor—Your man what rote that

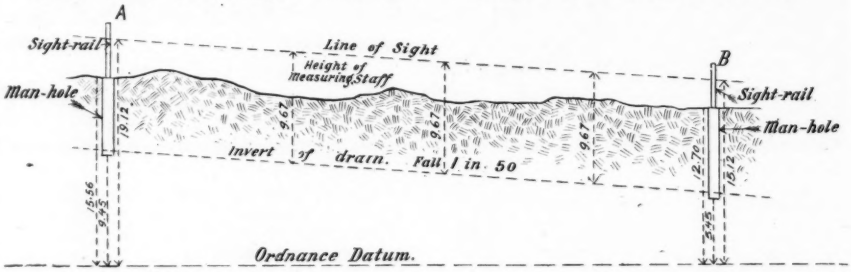
articul about barth-tubs for the poor knows what he is talking about. And his eggsample has encouraged me to rite a littul peace about "Barth-tubs in Tenements." Me and my husband don't know how we ever kept house without a barth-tub. In sumer we use it as an ice-chest. In winter we use one haf of it to keep cole in and the other half for sinders. Last sumer the ice man dropped a peace of ice and nocked a hole in the zinc lining, and we didn't no nothing about it. So Monday folering I took out the ice what was left and put my cloes to soke; it was so curious that the water kept running and yet the tub didn't fill up. At night the greedy landlord came up stairs and cumplained because the ceeling below was fell on the floor. He said he saw dirty cloes in the barth-tub and said he should take out the tub. Now if I had spoke to Mrs. Marsh what lives in the next tenemunt I wouldn't a said a word. Now she uses her barth-tub to keep her ashes and swill in. Then Miss Rhea she uses hers for a bed for Tommy. Why the other day before it was time to get up Tommy took a hamher and some sharp nales and drove little holes in the zinc lining to his bed. So when Monday came and his mother took out his bedcloes so she could put her washing to soke she had to paste paper over the holes before she could do her washing. Then the water went down somewheres and spoiled haf of a ceeling. Then the greedy landlord came upstares and said he should take out her barth-tub.

Now, has the landlord any rite to treat us so? Mr. Editor, you are a kind-hearted man and have symperthy for the poor tenants. What shall I do if my landlord takes out my barth-tub? Kind Mr. Editur, can't you use influoence at the State House and compell these cruel landlords who ring eight dolars every munth from our scanty wages to provide barth-tubs for the poor. Why, what will my poor bruther-in-law do for a place to stand his wheel? He cut off the faucet to the tub and soddered over the place. Rich landlords can get stands for their wheels chests for their ice bins for their cole but God help the poor tenant who only gets four rooms and a barth for eight dollars."

Laying Drains.

Austin, Tex.—To the Editor of "Domestic Engineering":

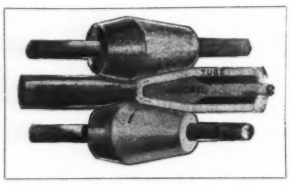
Sir: Will you have the kindness to publish for the benefit of a constant reader some information on the subject of laying drains which will give us some practical hints on this subject, which may be considered quite common, but which we consider quite important?



Answer.

One of the most important things in laying drains is to be certain that they are laid with a perfect and accurate gradient. For this purpose, it is desirable to construct sight-rails along the line of the proposed drain. These consist of two stout wooden uprights, having a horizontal wooden rail secured to them. You should plant the uprights in the ground far enough from the side of the trench to be unaffected by excavation. The horizontal rail should be perfectly straight on its upper edge and should be stout enough to avoid sagging when it is put in place. A measuring staff of considerable length must also be provided to use with the sight-rail. This may be made like an ordinary T, square with stout wooden upright and crosshead attached. The measuring staff is used when the pipes are being put in the ground, so that the invert of the drain may be parallel to the line of sight between the sight-rails. Some care must be taken to fix the sight-rails at their proper relative levels. Having fixed the datum line from which all measurements of height are made, it will be necessary to ascertain the levels of the surface of the ground and also the invert of the drain in order to determine the relative heights of the sight-rails. Fig. 1, which we show herewith, will be a good illustration for this purpose. The line across the base of the cut will be the datum line. The first inclining horizontal line will be the invert of the drain, and in this particular cut it has a fall of one in fifty. The second inclining horizontal line is the line of sight between the sight-rails, A and B. It will be seen, then, that in order to incline the invert of the drain in a perfectly even gradient of one in fifty, that the line of sight must have the same inclination. The distance between the invert of the drain and the line of sight is 9.67 feet, hence it will be seen that the sight-rail, A, must be 19.12 feet above datum, while the sight-rail, B, in order to secure the fall of one in fifty, must be 15.12 feet above datum. If 9.67 feet is deducted from 19.12 feet, it will be seen that the drain at its uppermost point must be 9.45 feet above datum and its lowest point must be 5.45 feet above datum. By using a measuring staff in conjunction with the sight-rail it will then be seen how easy it is to get the gradient exactly true. But the position of the sight-rail will have to be determined correctly by surveyors' instruments. The measuring staff must, of course, be 9.67 feet in length.

When excavating the trench, it should be done in a perfectly straight line to the



Hot Rolled from a Solid Cylindrical Billet.

The ideal tubing for exposed plumbing is "Benedict-Nickel" Seamless Tubing. It is far superior to nickel plated brass. The plating soon wears from brass in spots; and brass corrodes rapidly.

"Benedict-Nickel" takes a high polish and, with an occasional wiping, remains white forever. It never wears brassy—for it's "white metal clear through." Cannot grow unsightly—does not have to be renewed. When put in it is there to stay.

We are also among the largest manufacturers of Seamless Brass and Copper Tubing, and the ONLY manufacturers of this tubing hot rolled from a solid billet. (See illustration for process of manufacture.) This is the process used in the manufacture of "Benedict-Nickel."

Our Table Book, which contains many useful tube, sheet and wire tables will be sent to master plumber on request.

WHITE METAL CLEAR THROUGH
"BENEDICT-NICKEL" SEAMLESS TUBING
FOR RAILINGS AND EXPOSED PLUMBING
DEPOTS: 255 BROADWAY, N.Y. 122 HIGH ST. BOSTON
BENEDICT & BURNHAM MFG. CO.
WATERBURY, CONN.

necessary depth, and the bottom should be rammed down well and levelled to the required gradient. It is very desirable to lay all drains which carry soil pipe or any other water which is so fouled that it is not desired to seep away into the soil, on a bed of concrete. If the ground is firm and solid, this concrete bed need be notm ore than 4 inches deep, but where the ground is loose, wet and marshy, the concrete should be at least 6 inches. For perfectly clean drain water, such as comes from roofs and which is carried in storm water sewers, the concrete bed may be omitted.

If drains are laid on a concrete bed great care should be taken that the trenches are not made deeper than required, because when excavations have been made too deep, the bottom of the trench must be evened up in places, and if this is done with earth rammed home, settlements of the drain pipes will frequently occur; consequently, if excavations are made too deeply, the bottom of the trench should be brought up to a level with concrete.

Before laying the concrete bed, the bottom of the trench should be well rammed and the top of the concrete should be at least 12 inches wider than the diameter of the pipe. The surface must be gradually brought up to the required gradient. It is desirable to use wooden molds about 5 inches wide, 2 inches deep, and of a length equal to the width of the concrete inserted in the concrete bed at spaces 2 feet apart between centers. These molds are removed when pipes are laid, so that a depression is formed in the center of the concrete sufficiently wide and deep to permit the pipes to be inserted and jointed on the under side while the barrel of the pipe will be resting solidly on the concrete bed. When the drain has been laid and tested, then the concrete should be laid up against the sideof the pipes to aheight equal to half the diameter.

If a concrete bed is not used slight hollows should be cut in the trench to admit the pipe sockets so that the barrels of the pipe will lie solidly on the bottom of the excavation. Pipes should always be laid with the sockets towards the head of the drain.

After the pipes have been well laid and tested, earth should be carefully filled in around them at first and gently hammered down with the flat of the spade. Large stones should be taken away from the pipes and the earth should not be rammed until at least 2 feet is placed over the pipes.

Sometimes it is desired to put a drain under the walls of a building, and this case the drain should be entirely encased in concrete not less than 6 inches thick all around, so that no sewage which escapes can pass through the foundations into the interior of the building. If it can be possibly avoided, drains should not be constructed under buildings, except, of course, in the case of house drains. In this case, have a cast-iron pipe coated with some preserving preparation used, and the joints must be run with lead and calked thoroughly. The pipe should be laid within a well-constructed culvert open to the air at both ends. This can be done by using some of the inspection fittings now on the market. Instead of resting pipes on the bottom of the culvert, have them laid on T iron bearers built in the sides of the brick work, so as to raise them about 10 inches from the bottom. This makes every part of the drain accessible and leaves space all around to allow the pipes to be examined.

Where the drain passes through the foundation wall, an arch should be built over it to prevent the wall damaging the drain when it settles.

If it becomes necessary to increase the size of the drain, it should be done by properly formed increasers, the invert of the drain being kept at the same gradient throughout.

MISCELLANEOUS NEWS ITEMS.

Have Hospital Work.

Philadelphia, Pa., June 24.—(From a Staff Correspondent.)—The well-known plumbers, S. W. Barnes & Son, 2104 W. 6th street, have secured the contract for the plumbing in St. Marion's hospital.

Another Benedict.

Pittsburg, Pa., June 28.—(From a Staff Correspondent.)—Mr. H. L. Noll, for the last fifteen years connected with the Bailey-Farrell Mfg. Co., of Pittsburg, and Miss Catherine Yeckel, were married on Thursday, June 27, at the home of the bride's parents. Mr. and Mrs. Noll left immediately after the ceremony for the Pan-American Exposition.

Has Out of Town Work.

Philadelphia, Pa., June 24.—(From a Staff Correspondent.)—Charles Wilkinson, 264 South 17th street, has considerable work out of town. He is doing the plumbing in the residences of Dr. Dupont and Evelina Dupont, both in Greenville, Del. He has also secured the contract for the plumbing in the new school house in West Philadelphia.

Death of Wm. H. Sullivan.

From Bay City, Mich., comes the sad news of the death, on June 17, of Wm. H. Sullivan, of the Sullivan Plumbing & Heating Co. Mr. Sullivan was the proprietor of one of the oldest plumbing establishments in Bay City, having been in business there twenty-six years. The business will be sold by Mrs. Sullivan.

A New Local at Hazelton.

Through the efforts of the officers of the state association and of Mr. Hardy, of Hazelton, Pa., a new local association of the Master Plumbers has been organized at that place. The members are Geo. A. Kieley, the Mayer Plumbing & Heating Co., Geo. Hind, Fichter Bros., Thos. Gangham and Edward Walk. This includes all the plumbers of Hazelton, with one exception.

Independent Company in the Field.

Pittsburg, Pa., July 2.—(From a Staff Correspondent.)—Pittsburg capitalists have let the contract for 20 kilns 32 feet in diameter for the new independent sewer pipe plant to cost $100,000 to be erected at St. Marys, Pa. The new concern is managed by D. B. Anderson, of Toronto, Ohio. They have purchased a large area of clay lands and will be finely equipped in every detail.

Celebrate Anniversary.

Mr. and Mrs. Oliver H. Stinson, of Bailey avenue, Pittsburg, celebrated the tenth anniversary of their marriage June 25. For the afternoon Mrs. Stinson sent out about 75 invitations for a card party and about 50 invitations were issued for an evening card party.

Mr. Stinson is of the firm of Stinson-Kennedy & Co., one of the most prominent plumbing firms in Pittsburg.

A Clever "Catch Phrase."

Houston, Tex., July 1.—(From a Staff Correspondent.)—The Houston Plumbing & Manufacturing Co., one of the leading plumbing firms of this city, has adopted a clever and suggestive sentence which it uses on all its business stationery. It reads: "If the doctor visits your house too often, phone 400 and we will examine your plumbing." It tells more in a few words than a lengthy sermon on the need of proper plumbing.

Death of N. H. Trane.

N. H. Trane, bookkeeper for James A. Trane, died June 10th at his home, 1831 Cass street, La Crosse, Wis., of spinal meningitis, after an illness of four weeks. For some days his condition had been very serious, and his death, therefore, was not unexpected. Shortly before the end came, Drs. Christianson and Gunderson, and Maurer, held a consultation, but there was no hope. He gradually sank until death ended his sufferings.

Mr. Trane was one of the well known business men of the city, and had been a resident of La Crosse for the past twelve years. He leaves a wife and five children.

Strike Declared Off.

Grand Rapids, Mich., July 1.—(From a Staff Correspondent.)—The strike of the journeymen plumbers, which has dragged its weary length over many weeks, has been officially declared off, the union having accepted the proposition made by some of the employers to their men when they first went out; that is, three dollars per day for nine hours work by first-class men and two and a half for second-class men. Men putting in one or two hours work in the morning will be kept busy for half a day. Each employer reserves the right to employ whom he likes and to classify the men as in his judgment seems proper.

Embarrassment of Old Firm.

There are many in the trade who will learn with regret that the E. Stebbins Mfg. Co., of Springfield, Mass., has become involved in financial difficulties and made a voluntary assignment to Messrs. C. C. Spillman and Allen H. Warner, as trustees, for the benefit of its creditors. The company, which was founded in 1868, was very well known in manufacturing circles and up to the time of its assignment was supposed to be financially strong, being capitalized at $50,000. The company has always done a large business in the line of brass manufacturing, keeping about 150 men busy at its factory in Brightwood, a suburb of Springfield. Heavy borrowing is said to be the cause of the company's present embarrassment but the trustees say that in the opinion of those best fitted to pass judgment the affairs of the company may be untangled so as to secure all debts without loss to the creditors. The business will be continued for the present, at least, under the management of the trustees. A meeting of creditors will be held

at Springfield July 3rd and their advice as to the settlement followed by the trustees.

A. H. Warner, one of the trustees, has been a traveling salesman for the Stebbins company for some years and recently has had the practical management of the concern. C. C. Spellman, the other trustee, is a well-known lawyer.

The trustees, according to the agreement, may convert all the property of the company into cash for the benefit of the creditors, either at auction or private sale, and the trustees may carry on the business as long as necessary to accomplish the purpose. In case the company shall be adjudged bankrupt by any district court upon a petition filed against the company within four months, the present trustees shall give over to the trustees appointed by the court the proceeds of any sale and all property belonging to it. Otherwise the payment is to be to the creditors. The creditors are required to assent to this agreement in writing within 60 days to get any benefit from the arrangement.

Pertinent Points for People Who Put in Pipe.

By Dent Yates, C. P., Kansas City, Mo.

I wonder if all the large cities are afflicted with certain grafters called "Engineers," who run office buildings and hotel plants. A few years ago these engineers were satisfied to run their plant and draw their commission from the coal man and let it go at that. But things have changed. If there is a new steam boiler to set or a steam line to run which would give a good master steam fitting firm a job and the owner of the building good service like in days of yore, the Grafter Engineer sneaks up to the agent or owner and tells him he can save the building all kinds of money by doing it themselves. He goes to the wholesale house and buys the pipe and fittings at a good large price, holds out his mitt and receives his commission—the boiler man must cough up a commission, the brick man ditto, and so on all down the line. The next move is to get some poor journeyman who needs a job bad enough to work for him, and Mr. Smart Alec bosses the job. Now and then the boss comes around and Mr. Grafter gets busier than a cranberry merchant; when he goes it is up to the pipe fitter again. Finally the work is done and in nine cases out of ten it is very badly done. The fitter usually knows very little anyhow, or he would be at work for a master fitter. If he happens to be a competent man he takes no interest in working for a lobster. The work costs more and the only person benefited is the engineer who gets his rake-off. The only remedy for this sort of thing is to ask the owner to allow you to make a price on the whole job complete. Then ask him to let his engineer get his figures on the material and then let his engineer guarantee the labor account. I have made several of these commission shark engineers take a back seat in this way and taken in a few good jobs. The labor unions are able to control this state of affairs in some cities but not here. By all means check this practice off when you can. It was a common thing for these engineers to put in closet bowls, move wash stands and botch up plumbing, but Ed. Blanchard, the present plumbing inspector, believes in plumbing for plumbers, farming for farmers and engineering for engineers. He got out a few warning notices, jerked one or two up before the police judge and stopped the deal right there. I expect to be criticized for this article and maybe it will cause some decent engineer to get his hammer out after me, but I can't help it. It is all right for engineers to do emergency work or repair work on steam plants or to repair faucets in their own building, and the majority of our engineers try to give the master and journeymen fitters and plumbers a square deal, but we have a few grafters who need fixing and need it bad.

* * *

The big convention is over and the plumbing people have returned to their happy homes. It was certainly a great event for Kansas City and our boys received a great many congratulations on their success as entertainers, and we are very proud Ed. Hornbrook was elected president of the National, as every one knows, but every one does not know how well he stands with the community at large and with his fellow plumbers who meet him in the arena of competition and many times are we overthrown. Very seldom in the way of price, though, for Ed. gets a better price and earns it better by doing better work than anybody I know. He also has the good fortune to have a wife who is a helpmate in the highest and truest sense, and every lady who visited the convention will bear witness to the tactful and gracious manner in which she presided over and carried out the various entertainments given the ladies. There is only one Mr. and Mrs. E. D. Hornbrook and they live in Kansas City, U. S. A.

* * *

Geo. Kirtley, the new National secretary, is one of our people also. Geo. will make a good secretary, and give everybody a square deal. I do hope the good people of the craft won't think I am handing out too much jolly about Hornbrook and Kirtley, but somebody ought to say good things about them while they are yet alive, and why not one of their home folks?

The Mueller Picnic.

On Saturday, June 8, the employes of the H. Mueller Mfg. Co., of Decatur, Ill., together with their wives and babies, sweethearts and friends, enjoyed their fourth annual outing and picnic at Reservoir Park, near Paris, Ill.

The shop employes and members of the Mueller company met at the factory at 7 o'clock, and headed by the Goodman band, marched to the station, making a fine appearance in their uniform of white duck trousers, blue sack coats and white caps.

There were in all 13 cars full of the excursionists and their lunches, and it was found necessary to run the train in two sections.

At Paris the party was met at the station by the mayor and city officials, and the uniformed rank again formed in triumphal procession and paraded the streets of Paris, to which they were given cordial welcome. Returning to the station they again boarded the cars, which were switched to Reservoir Park, several miles distant.

Just before the party reached the park a drizzling rain set in which continued without intermission throughout the day. This naturally marred the day's pleasure to some extent, but the party had come many miles for a good time and were not to be cheated out of it. Many of the more hardy ignored the rain entirely and boated and fished and played ball as though the skies were clear. The more careful disposed themselves comfortably in some of the numerous shelter tents and pavilions and danced or chatted to the music of the band. Many took a trip around the lake on the fine steam launch, and all agreed that while it was "perfectly horrid" of the rain to come on that particular day, it took more than rain to spoil their good time.

The picnic was conducted under the auspices of the Mueller Mutual Benefit Association, an organization of the Mueller employes for the purpose of mutual helpfulness in sickness and distress and the promotion of good fellowship at all times.

The company is to be congratulated upon the existence of such an organization among its employes. It speaks volumes for the loyalty of the company's working force to each other and to the company.

No top washers or packing
No small nuts or fine threads
Both seat & washer accessible
Quick and easy to operate

Features of the Apex Faucets obtained by a radical change in the construction of the working parts.

MADE ONLY BY

Homer Brass Works
(Incorporated)
231 Race St., Philadelphia
Established 1828

The employees of H. Mueller Mfg. Co., Decatur, Ill., on their way to the picnic train.

News from Minneapolis

DOING FLAT WORK.

Minneapolis, Minn., July 2.—(From a Staff Correspondent.)—H. Kelly & Co. are plumbing the McDonald flats on Blaisdell avenue.

FOR REALTY CO.

J. M. Jacobson is plumbing the Yale Realty flats on Vine place.

DOING GOOD JOB.

The Cody Plumbing Co. are plumbing a fine residence on Marshall avenue N. E. for Theo. Schultz.

GOOD HOTEL JOB.

Miles Sherin is installing the fixtures in fourteen new bath rooms in the National Hotel, Washington Ave. So. Wolff's goods are being used.

HARD AT WORK.

A. W. Scott is hard at work with a large crew putting entire new plumbing in the building to be used as the New Hyser Hotel, Nicollet and 4th street.

THE VERY BEST.

A. W. Scott is now occupying his magnificent new house in Kenwood. You can rest assured the plumbing and fixtures in this house are the very best.

OH, SO PATIENTLY!

Fred Yost, who has a farm as a side issue to his plumbing business, was married June 15th. The boys are patiently waiting for the cigars, a keg of nails or a bottle of ink.

PLUMBERS VS. JOBBERS.

Friday night, June 21st, the Master Plumbers defeated the Jobbers in a series of ten-pin games. Other games will follow soon.

Totals: Plumbers 2743 pins, Jobbers 2542 pins. High score, Chaffee 200; low score, Schuler 155.

PLAYERS.

Jobbers:	Plumbers:
Chaffee.	Sohler.
Fowler.	Schuler.
Frey	Jimmerson.
Lobdell.	Johnson.
Rice.	Jacobson.
Cassell.	Potter.
Cody.	Kammerlohs.

TWIN CITY VISITOR.

Minneapolis, Minn., June 18.—(From a Staff Correspondent.)—E. L. Walcott, president of the Flush Tank Co., Aurora, Ill., was a recent Twin City visitor, on business.

STRIKE PAY-ROCK EARLY.

Martin Feehan and Charley Doyle, two wide-awake, hustling journeymen plumbers of St. Paul, who opened up a place of business on West 7th street, several months ago, are doing a rushing business.

WERE THE SUCCESSFUL BIDDERS.

Archambo Heating & Plumbing Co. were the lowest bidders for plumbing the Calhoun and Corcoran schools; their bid was $1,350 for both, or $696 each. Work will be completed before Sept. 1st.

MAKING A GO OF IT.

Andy Walker, of Butte, Mont., was a Minneapolis visitor in June. Andy is engaged in the plumbing business at Butte and is taking out pay rock in large quantities.

LOSES BY FIRE.

Arthur H. George, successor to the business of Kearney & Co., lost his barn by fire June 28th, with all its contents, two horses, wagons and buggy. The cause of the fire is a mystery; loss about $500.

HIGHLY SATISFIED.

The Minnesota delegates to the Plumbers' convention, recently held in Kansas City, returned home slightly disfigured but still in the ring. They are jubilant over the "Local Agreement with Jobbers" clause, which is now arranged to their entire satisfaction, and it is claimed for it that Twin City conditions will be greatly benefited thereby. Delegate Schuler interviewed Carrie Nation, Wm. Jennings Courtney bought a hair cut, and Col. Sure Shot piloted the crowd safely about town.

TRADE WANTS.

WANTED—SALESMAN FAMILIAR WITH steam, hot water or furnace business, to travel in territory west of Chicago and vicinity. Good opening for party understanding above business and wishing to travel. Address "A. V." care Domestic Engineering 64 N. Jefferson St., Chicago. 7-13—July

WANTED—TRAVELING MEN TO CARRY our line of sanitary specialties as "side line." We only want those who can furnish the most satisfactory references. Address in perfect confidence, 506 care Domestic Engineering, 64 N. Jefferson Street, Chicago. t.f.

TRAVELING MEN, ATTENTION—WE HAVE some taking specialties in the heating line which we desire traveling men to present as "side lines" to the trade. We shall be glad to correspond with those who can furnish satisfactory references. Address, 1882, care Domestic Engineering, 64 N. Jefferson St., Chicago. t.f.

PLUMBERS AND STEAM FITTERS MAKE best agents for specialties in sanitary and heating lines. We desire five hundred plumbers and steam fitters of good repute who can furnish satisfactory references, to act as introducing agents for our specialties to the consuming trade. We pay liberal commission but only desire to do business with those whose reference is satisfactory. Address, 1817, care Domestic Engineering, 64 N Jefferson St., Chicago t.f.

Napoleon said, "The Lord is on the side of the strongest battalions." So the success of a fitter depends upon his choice of goods. Can a man choose for his trade a better heater than a "Winchester"? It's a tower of strength in any heating outfit. For steam or water. Smith & Thayer Co., Boston, Mass.

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Monthly Edition

The leading paper in the world devoted to

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HERBERT T. SHERRIFF, Assistant Editor
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John R. Keeney. C. M. Carrier.

Mechanical Department

F. Chas. Hill . . . . . Superintendent
Evan H. Sample . . . Foreman Pressroom

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JULY 15, 1901.

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Showing application of Flushometer.

The Kenney System
FOR FLUSHING WATER CLOSETS

The only system that will operate successfully at all times one or any number of closets under the varying conditions of water pressures. NO NOISY AND DIRTY OVERHEAD TANKS. NO CUP LEATHERS OR SPRINGS.

Endorsed by sanitary engineers and plumbers.

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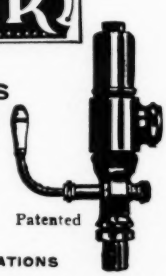
TRADE MARK



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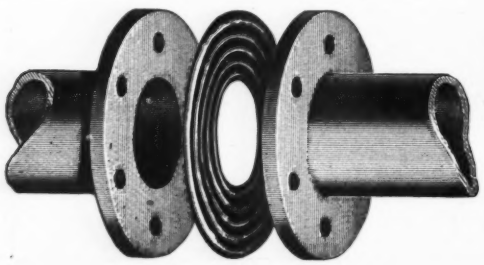


OUR PATENTED
MINERAL WOOL PIPE COVERING AND COPPER GASKETS

THEY SAVE STEAM AND MAKE ABSOLUTELY TIGHT JOINTS

BEST AND CHEAPEST
SAMPLES FREE

UNITED STATES MINERAL WOOL CO.
143 Liberty Street, NEW YORK.

THOMSON

Meter Company

79 Washington St., Brooklyn, N. Y.

25,145 Water Meters sold in 1899.

26,414 Water Meters sold from January 1st, 1900, to January 1st, 1901.

176,717 Water Meters sold to January 1st, 1901.

We Stamp our Meters only as they are sold.

TRIMO PIPE TOOLS

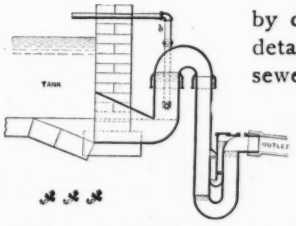
All these tools are drop forged from steel. No others made so strong and durable. No expense spared to make the **best.** Give them a trial and be convinced.

Trimo Pipe Cutter Is convertible from a single wheel with rolls, into a three-wheel cutter, by substituting the two extra cutting wheels that accompany each tool, to be found in the handle, which is provided with a receptacle for same (see cut).

TRIMONT MFG. CO.

SOLD BY ALL JOBBERS. ROXBURY, MASS.

Increase Plumbing



by doing work for country and detached buildings having no sewers. Our

RHODES-WILLIAMS AUTOMATIC RAW SEWAGE SIPHONS

dispose of sewage in an absolutely sanitary way. Our Free Catalogue shows everything.

THE FLUSH TANK CO., - AURORA, ILL.

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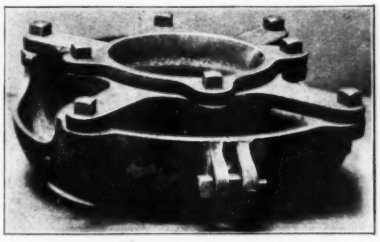

Replaces cement joint between iron soil pipe and earthenware sewer pipe, keeping sewer gas absolutely out. There is no "IF" about it. Our circular free.

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3811 COTTAGE GROVE AVE., CHICAGO, ILLINOIS.

All first class Plumbers are using the New Style

Broughton Self Closing Basin Cock

NO EXPOSED SURFACES, EASILY KEPT CLEAN

THE BROUGHTON SELF-CLOSING BIBBS & COCKS HAVE BEEN ON THE MARKET SEVERAL YEARS - SUPERIOR TO ALL OTHERS FOR SIMPLICITY AND STRENGTH - EVERY ONE WARRANTED.

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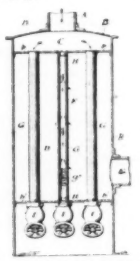
PATENTS AND INVENTIONS

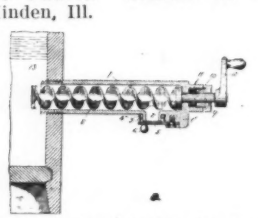
The cuts illustrating patents and inventions in this department of Domestic Engineering are furnished by Oscar A. Michel, Solicitor and Registered Attorney for American and foreign patents, at 302 Broadway, New York City. Anybody desirous of having a patent or invention illustrated will please correspond with Mr. Michel regarding it.

671,003—Filter. Marcus Ruthenburg, Philadelphia, Pa.



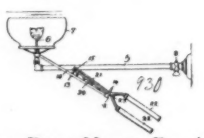
Powell Bros., Philadelphia, are remodelling the plumbing in the house of Mr. Jas. Gay, using Cooper's Nautilus closets, baths, lavatories, etc.—Adv.

671,153—Faucet. Charles L. Weihe, New Minden, Ill.



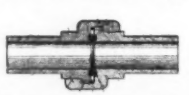
Ernest Schenck, Philadelphia, is plumbing the new residence of Dr. Seltzer, using Cooper's closets, baths, lavatories, etc.—Adv.

670,930—Heater for curling irons. Geo. F. Fiske, Chicago, Ill., assignor to the Jiffy Manufacturing Company, same place.



Wm. Love, Bryn Mawr, Pa., is remodelling the plumbing in the house of Mr. Joyce, using Cooper's Nautilus closets, baths, lavatories, needle, showers, etc.—Adv.

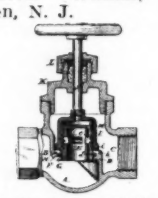
671,158—Pipe-coupling. Alexis Burmeister, Fort Madison, Iowa, assignor of seven-eighths to Joseph Ost, Ira B. Lesh, Fred R. Nagel and Walter G. Smith, same place, and Charles M. Hewitt, Chicago, Ill.



F. J. McGarry & Bro., Philadelphia, have some nice work on hand in which they are using Cooper's goods.—Adv.

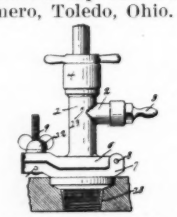
671,166—Hose-coupling. Edward W. Mitchell, Oberlin, Ohio.

671,194—Valve. William J. McCausland, Camden, N. J.



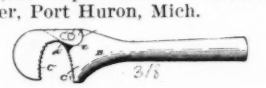
Timothy McCarthy, Philadelphia, has several nice jobs on hand in which he is using Cooper's goods.—Adv.

671,284—Barrel tap and bushing. Albert Kummero, Toledo, Ohio.



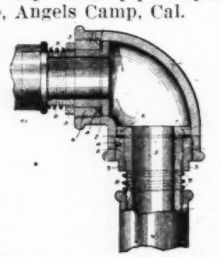
Jas. Openshaw, Newport, R. I., has some alteration work on hand in which he is using Cooper's Nautilus closet.—Adv.

671,318—Pipe-wrench. Herbert W. Fraser, Port Huron, Mich.



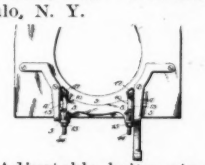
T. J. O'Mally, Scranton, Pa., has a contract for plumbing a fine residence in which he is using two of Coopers Nautilus closets.—Adv.

671,366—Adjustable pipe-coupling. Geo. M. Brodie, Angels Camp, Cal.

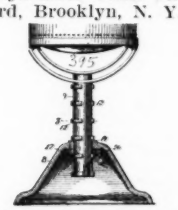


J. E. Hoffer, Philadelphia, is plumbing the residence of Mr. Artman, on Walnut street, using a number of Cooper's baths, lavatories and Nautilus closets.—Adv.

671,360—Closet-seat. Howard D. Waters, Buffalo, N. Y.



671,395—Adjustable boiler stand. Edwin Hayward, Brooklyn, N. Y.



Robt. W. Kyle, Wheeling, W. Va., recently installed some of Cooper's filters in work he has on hand.—Adv.

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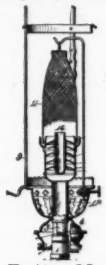
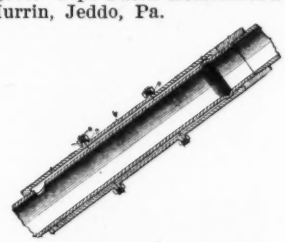
Thomas A Edison

673,303. Incandescent Gas Burner. Clarence W. Taylor, Sioux City, Iowa.

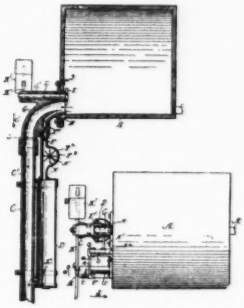


I. Krueger, Butte, Montana, has some work on hand in which Cooper's lavatories and closets are being used.—Advt.

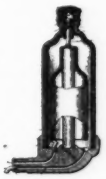
672,955. Pipe-Patch Attachment. Chas. T. Murrin, Jeddo, Pa.



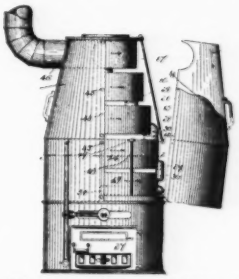
672,431. Apparatus for Flushing Water-Closets. Adolphus La Bonte, Worcester, Mass.



673,319. Air and Vacuum Valve for Radiators. Walter H. Duer, Fond du Lac, Wis.



673,081. Hot Water Heater. Franklin P. Hinds, Waltham, Mass., assignor of one-half to John H. Sullivan, Boston, Mass.



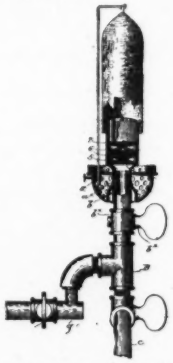
F. A. Wendall, Salem, Mass., is doing some work in Marblehead, Mass., using Cooper's goods.—Adv.

673,394. Incandescent-Mantle Support. Max Herskovitz and Abraham L. Herskovitz, Chicago, Ill.

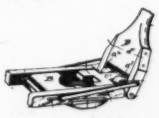
We are making a specialty of fine China articles for metal mountings. Scalp marks and China handles of every description. Samples furnished on application.

THOMAS MADDOCK & SONS,
TRENTON, N. J.

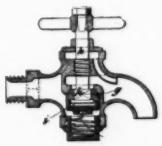
672,888. Incandescent Gas Light Apparatus. George H. Burrows, Somerville, and George L. Weaver, Boston, Mass., assignors to the Incandescent Gas Light Company, Boston, Mass.



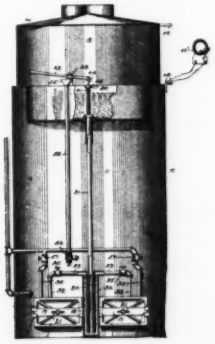
672,910. Pipe-Clamp. William Linerode, Bolivar, Ohio.



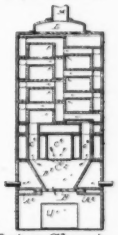
673,294. Stop-Valve. William A. G. Schönheyder, Clapham Park, England.



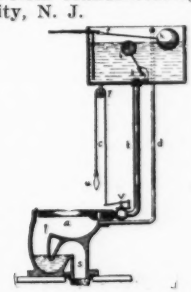
673,843. Acetylene-Gas Generator. Peter F. McCaffrey and Thomas E. McCaffrey, Salt Lake City, Utah.



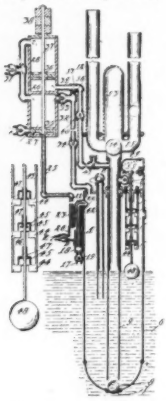
672,400. Hot-Water Furnace. Joseph T. Robbins, Des Moines, Ia.



673,820. Water-Closet. Frederic S. Perrin, New York, N. Y., assignor to the Schmidt-Perrin Manufacturing Company, Jersey City, N. J.

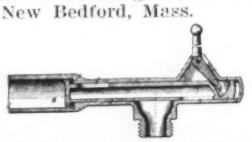


671,600. Means for Raising Water. Julius Kurtz, Denver, Colo.

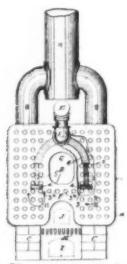


A. L. Boorse, Bustleton, Pa., is remodelling the plumbing in a residence of that city, using Cooper's goods.—Adv.

671,717. Self-Closing Valve. George A. Blake, New Bedford, Mass.

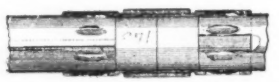


671,772. Downdraft Water-Tube Boiler. Orel D. Orvis, New York, N. Y., assignor to George S. Terry, trustee, same place.



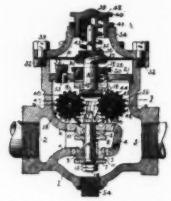
St. John & Barnes, Colorado Springs, have some nice work on hand in which Cooper's goods are being used.—Adv.

673,971. Pipe-joint. Charles A. Bartliff, St. Louis, Mo.

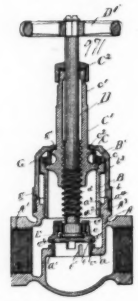


Cyrus Spalding, Webster, Mass., is plumbing a residence in that city, using three Cooper's Nautilus closets.—Adv.

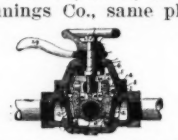
671,441. Reducing-Valve. William C. Jennings, Camden, N. J., assignor to the W. C. Jennings Co., same place.



671,971. Valve. Henry Lippold, Erie, Pa.

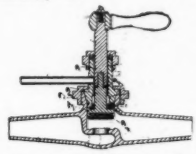


671,443. Rotary-Valve. William C. Jennings, Camden, N. J., assignor to the W. C. Jennings Co., same place.



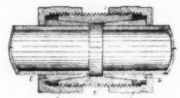
J. J. Fynn, Germantown, has some nice work on ahnd in which he is using Cooper's goods.—Adv.

672,078. Stop-Cock. George H. Harrington, Cincinnati, O.

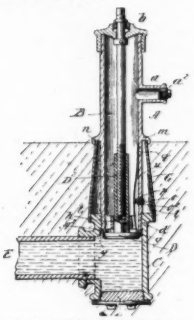


Thos. D. Clarke, Philadelphia, is plumbing the house of Mr. Elliott, using Cooper's Nautilus closets, baths, etc.—Adv.

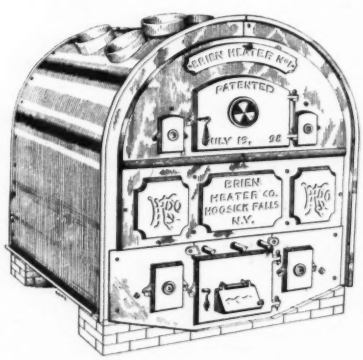
672,244. Pipe-Joint. Rudolf S. v. Traunfels, Vienna, Austria-Hungary.



672,265. Hydrant. Benjamin F. Farrar, Springfield, Mass.



Roberts Leinau, Philadelphia, is plumbing the residence for Mr. Whitehead, using Cooper's Nautilus closets.—Adv.



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Hot Air Furnace

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Write for Territory, Catalogue and Prices.

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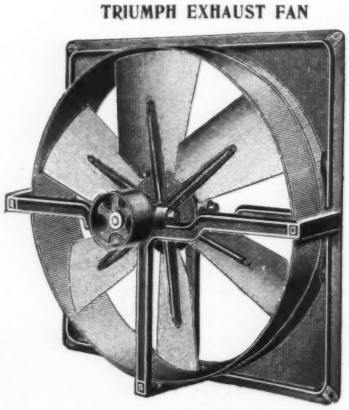
TRIUMPH EXHAUST FAN



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INDIANAPOLIS, IND.

MANUFACTURERS OF

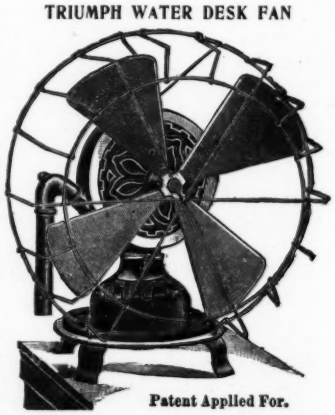
TRIUMPH EXHAUST FANS, Belted in sizes of 14 inches to 96 inches; direct connected for all standard voltages of direct current, in sizes of 30 inches to 48 inches.

CEILING, COUNTER AND FLOOR COLUMN FANS for belt power.

WATER DESK FANS, COUNTER AND FLOOR COLUMN FANS, for water power and water motors.

Write for Catalogue and Discounts.

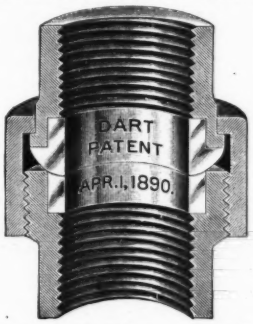
TRIUMPH WATER DESK FAN



Patent Applied For.

THE DART UNION.

This illustration shows the Dart Union with bronze ball seats, ground joint, malleable iron ends and nut. Upon applica-

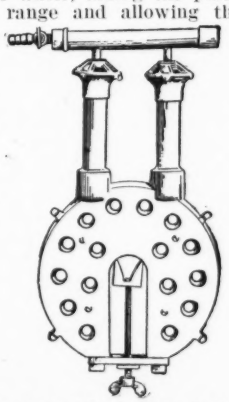


tion to the manufacturers, E. M. Dart Mfg. Co., Providence, R. I., prices will be sent if you mention "Domestic Engineering."

Harry C. Worrel, Riverton, N. J., has some nice work on hand in which he is using Cooper's goods.—Adv.

THE HELLER HEATER.

This heater which we show is to be placed underneath the range boiler and will supply the kitchen and bath-room with hot water, taking the place of the kitchen range and allowing the range



fire to be dispensed with during the summer months. This heater placed under a range boiler completes the summer devices for a kitchen. It gives perfect combustion and emits no odor. It is made by J. P. B. Sadtler & Co., 813 South Howard St., Baltimore, Md.

A PUSHING NEW YORK SUPPLY HOUSE.

Among the dealers in the Metropolis who are attracting particular attention by the energy with which they go after business is the Metropolitan Supply Co., 2505 3rd Ave., New York City, who are manufacturers and dealers in plumbers' specialties and plumbers' and steam fitters' supplies, slate and marble work, etc. They will be glad to quote prices upon orders of any size upon application, mentioning "Domestic Engineering."

THE JENKINS AIR VALVE.

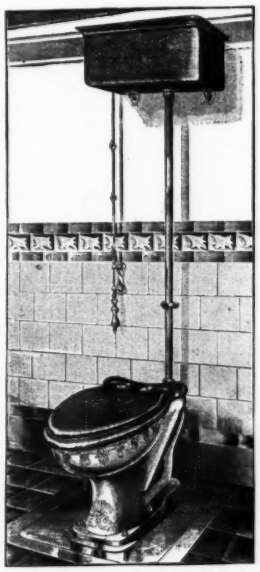
We show herewith the Jenkins automatic air valve suitable for high or low pressure. It takes no more room than the ordinary air cock. Some leading steam experts say this is the best made and quickest working. The genuine are all

stamped with Jenkins Bros. trade mark as shown on the illustration. Prices will be sent upon application to Jenkins Bros., Boston, Mass., Chicago, Ill., or Philadelphia, Pa.

I. B. Thorn, Philadelphia, is doing some plumbing work on Filbert street, using Cooper's goods.—Advt.

THE ORINOCO SIPHON JET.

The Duquesne Mfg. Co., of Pittsburg, Pa., manufacture this Orinoco spihon jet water closet, which is perfect and noise-

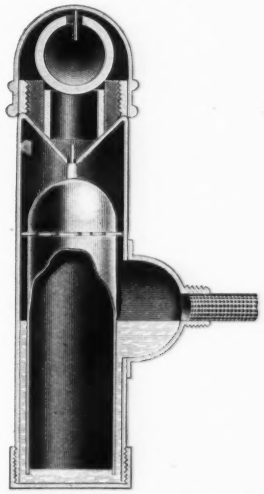


less in its operation. They claim that its finish cannot be excelled, and ask the trade to try a sample and be convinced. Upon application, mentioning "Domestic Engineering," catalogue will be sent.

W. D. Theobald & Co., Canton, Ohio, recently set a Cooper's Nautilus closet in a residence in Massilon, Ohio.—Advt.

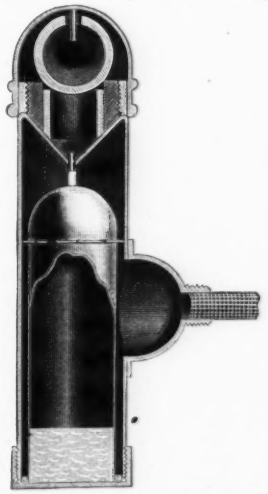
THE MORGAN VACUUM VALVE.

Morgan & Co., 40 Dearborn St., Chicago, Ill., send out a catalogue describing the Morgan vacuum valve, which we illustrate herewith. The check or vacuum portion of the valve consists of a threaded extension at the top of the valve, into which is screwed a cylinder of vulcanite or hard rubber. Into the inner circle of this cylinder is driven a brass ferrule forcing the vulcanite into the threads of the extension and holding



it firm under all conditions. The inside upper part of the vulcanite cylinder is an abrupt angle with a very sharp edge; upon this edge rests the hollow rubber ball, being guided to its seat by pin projecting downward from cap into ball through opening provided for that purpose.

The properties of the vulcanite are such that while it will retain its sharp edge it also softens under the heat and will not cut the ball. The cap can be readily



removed and ball replaced. The automatic feature of the valve for allowing the escape of air and preventing the escape of steam and water is a radical departure and an entirely new principle. The operation being as follows: The

lower end of the float being in the well formed by the portion of the valve below the nipple connection is sealed by the water of condensation. The heat expands the air thus sealed in the float, raising the float to its seat. Should pressure increase to the point of compressing the expanded air in the float, the water is forced into the float, keeping the float to its seat and the valve closed. As pressure subsides the air that was compressed expands forcing the water from the float into the well, the float remaining at its seat through flotation. In absence of heat the water in the well is drawn into the float by contraction of the air in the float; this water adding its weight to the float causes same to drop from the seat, leaving the valve open. Any air that has been displaced from the float during the operation is replaced by gravity as soon as the water in the well entering the float reaches the level of the bottom of the float. This action or principle guarantees the constant maintenance of an equilibrium. This fact, together with the expansion of the air by heat, insures always the operation of the valve in the highest sensitive degree. The swell between nipple connection and the body of the valve is to prevent capillary attraction, rendering unnecessary the use of a siphon or double passage through nipple, as in the case of other forms of valves. The screen at end of nipple is a brass gauze, its purpose is to maintain a steady water level in valve irrespective of the fluctuation of the water in the radiator due to carelessly closed radiator valve or other causes. The flange on float above the inlet or valve serves to quickly raise the float to the seat and close the valve should there be for any reason a rapid inflow of water from radiator to valve. The pin at top of float is of German silver, having a taper shoulder that effectually closes valve without permitting pin to stick in opening and keep valve closed when it should be open.

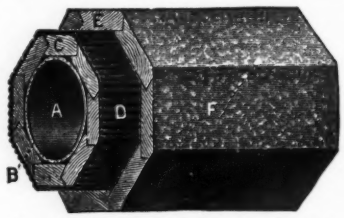
The manufacturers state as follows: We wish to emphasize the fact that there is no adjustment to this valve. That being made of brass it cannot be thoughtlessly injured and that the elements contained in the heating apparatus are alone its motive power. Our belief is that 90 per cent of the usual amount of radiation and this valve will do as much as 100 per cent and the ordinary valve. We guarantee the valve in every particular and replace any balls free not lasting a heating season. Price is $1.50 each. For the complete catalogue send to Morgan & Co., 40 Dearborn St., mentioning "Domestic Engineering."

A "New Life" Boiler.

We illustrate herewith the "New Life" boiler, manufactured by the Des Moines Mfg. & Supply Co., 101-121 E. Court Ave., Des Moines, Ia. As will be seen from the sectional cut we show herewith the boiler is a double return heater of the locomotive firebox type. It keeps the heat concentrated until the flues are reached. The flues are traversed twice and all the heat is extracted which it is possible to secure. In the water boiler the circulation is perfect. Only the best steel plate is used with 4-inch standard boiler flues. It is a boiler which is easily accessible for cleaning and is very easily repaired and is made for from 600 to 2,800 sq. ft. of radiation.

The Wyckoff Pipe Covering.

Where central heating plants are used it is absolutely essential that the pipes shall be covered in such a way as to prevent the waste of heat. For this purpose Wyckoff's patent steam pipe covering has come to be looked upon as the very best which can be used. The cut which we show herewith will be understood when we say that A represents a tin lining, B an asbestos layer, C a wood pipe, D a layer of corrugated paper, E a wood pipe, and F an asphaltum coating. It is very difficult for heat to get out of such a covering. It is made by A. Wyckoff Sons Co., 11 E. Chemung Pl., Elmira, N. Y., who will send catalogue upon application mentioning "Domestic Engineering.'



G. W. Burnes, Brooklyn, N. Y., has some alteration work on hand in which he is using Cooper's goods.—Adv.

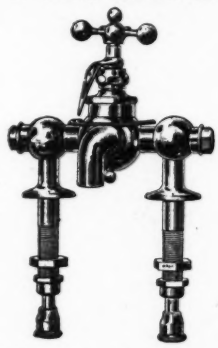
The Vapor System.

The Vapor Heating Co., of York, Pa., are makers of Broomell's vapor system, which is adapted to the heating of buildings of any kind and size. It is absolutely noiseless, no pressure, has no air valves and requires no pumps or machinery. The heat is under perfect control and the system can be installed by any fitter. Catalogue will be sent upon application mentioning "Domestic Engineering."

John Armstrong, Germantown, has recently secured a large contract in which he will use a number of Cooper's Nautilus water closets, lavatories, baths, slop sinks, laundry trays, etc.—Adv.

The Soderlund Twin Faucet.

Once in a while an entirely new device gets on the market and attracts a great deal of attention. This is the case with the Soderlund twin faucet which is a cold and hot water faucet with but one handle and is for use on lavatories, baths, showers, etc. It cannot leak and has an indicator which shows the temperature of the water being drawn. It is made by the Union Brass Works, 11 Hawkins St., Boston, Mass., who will be glad to send a sample upon application if there is any business in sight. Mention "Domestic Engineering" when writing please.



J. G. Stacey, Geneva, N. Y., is remodelling the plumbing in the residence of a prominent citizen of that city, using Cooper's Nautilus closet with Atavic valve.—Adv.

A Comprehensive Catalogue.

The National Supply Co., of Toledo, O., have issued their 1901 catalogue (No. 9) of steam and gas fitters', mill and railroad supplies, of which they will be pleased to send copies to all interested in these lines. It is of handy size and very voluminous, containing 766 pages.

They have also just issued an oil and gas well supply catalogue and are now at work on a catalogue of staple and special plumbing goods, which will be ready later in the year. Their catalogue work is in the able hands of Mr. L. I. Plummer.

F. A. Wendall, Boston, has the contract for plumbing a residence in that city in which there are two sets of Cooper's bath-room fixtures being used, including Natutilus closets.—Adv.

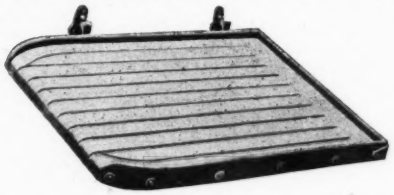
Country Plumbing.

Plumbers who are prepared to do plumbing in isolated buildings in the country or subdivisions not yet supplied with water, will be glad to know of the Kewanee Pneumatic Water Supply Co.'s system for supplying water in such cases. They have a very beautiful pamphlet which will be sent upon request, which illustrates how the plumbing business can be increased by being prepared to put in this system. They may be addressed at Kewanee, Ill. When you write please mention "Domestic Engineering."

H. A. W. Smith, Ocean City, is plumbing the residence of Mr. S. S. Wenzall, using Cooper's closets, baths, etc.—Advt.
plumbing a large apartment house, using Cooper's brass work.—Advt.

Plumbers' Woodwork.

H. B. Olmstead & Co., 87 Frankfort St., New York City, manufacture plumbers' woodwork of the highest character from special woods such as mahogany, bird's eye maple, sycamore, black wal-



nut, etc. They make a specialty of drain boards, one of which we show herewith. Upon application mentioning "Domestic Engineering" they will be glad to quote prices upon any of their woodwork.

The Dwyer Plumbing & Heating Co., St. Paul, Minn., have some large contracts on hand in which Cooper's closets are being used.—Adv.

Cooper Adjustible Drain Trap.

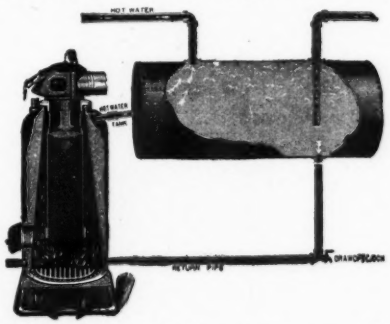
This drain trap is an absolute protection against sewer gas entering a building. A plumber can save quite a sum of money on every trap he installs. The manufacturers say $1.75 to $2 can be saved on each trap. It takes the place

of a number of other complications. The sales agents, Libbey, Parker & Co., of Boston, Mass., will be glad to show you how you can make this money if you will write them, mentioning "Domestic Engineering."

A. D. Harvey, Fox Chase, Pa., is plumbing a residence for Mr. H. Shallcross, using Cooper's Nautilus closets, baths, lavatories, and other plumbing fixtures, made by Cooper.—Adv.

Heating Water.

The Wilks water heaters for supplying hot water for apartment buildings, hotels, bath houses, etc., have been before the trade for many years. The illustration we show herewith indicates



the method of installing the heater with horizontal boiler for storage purposes. Their catalogue describes these goods fully and will be sent upon application to S. Wilks Mfg. Co., 53 S. Clinton St., Chicago, Ill., if you mention "Domestic Engineering."

The Dale Ball Cock.

Here is a ball cock which is very highly spoken of by master plumbers who have used it. It is said it cannot pound;

always closes; is accessible, and is a very durable one. It is guaranteed to be perfect by the Wolverine Brass Works, Grand Rapids, Mich., who are its manufacturers.

H. L. Bridgman, Saginaw, Mich. ,has some work on hand in which he is using Cooper's goods.—Adv.

Champion Water Filter.

We show herewith the Champion water filter which is made by the Champion Safety Lock Co., 95 Woodland Ave., Cleveland, O. These filters are germ proof and are made in five styles and fourteen sizes so that any one who has

the agency for them cannot fail to have a filter which will meet any demand which may be made upon it. The company is anxious to arrange with reliable plumbers for profitable agencies and will quote prices to such as apply, mentioning "Domestic Engineering."

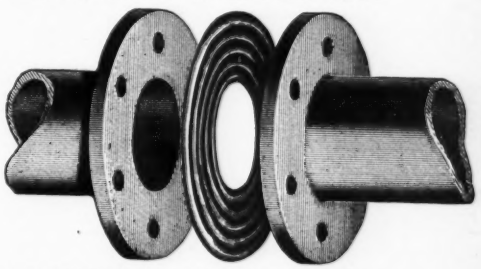
The Adonis Closet.

The Western Brass Mfg. Co., 617 Walnut St., St. Louis, Mo., will be glad to send you advance sheets showing the Adonis water closet in a larger style than

the illustration we give herewith. They also make fine bath-room fixtures and sanitary specialties. In writing them please mention "Domestic Engineering."

Copper Gaskets.

By the use of these copper gaskets steam joints are made absolutely tight. The gasket is made by the United States



Mineral Wool Co., 143 Liberty St., New York City, who will be glad to quote prices upon application if you mention "Domestic Engineering."

Geo. F. Uber & Co., Philadelphia, are plumbing a residence on N. 17th St., using Cooper's baths, etc.—Adv.

The Winchester Heater.

There are a good many steam and hot water heaters who trace the beginning of their success to the securing of the agency for the Winchester heaters. The Smith & Thayer Co. take to themselves the credit of having built up a great many businesses by the results of their

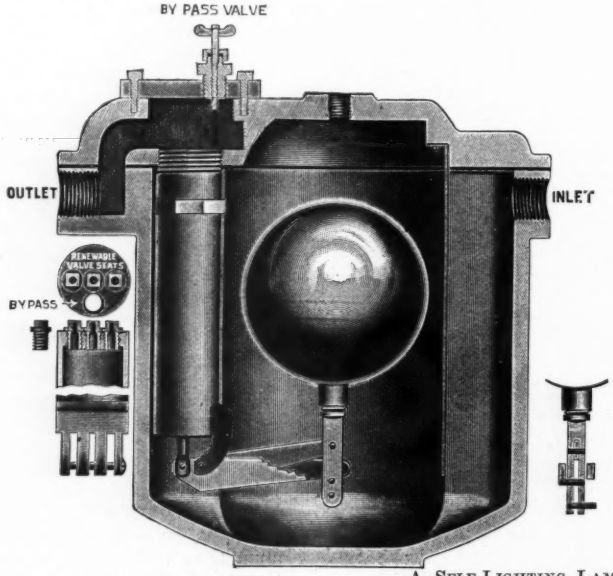
heater. Because when a customer uses a Winchester heater he is perfectly ready to recommend it to his neighbor. Smith & Thayer Co., Boston, Mass., are the manufacturers and would be glad to receive some correspondence from you, mentioning "Domestic Engineering."

THE WRIGHT EMERGENCY STEAM TRAP.

The Wright Mfg. Co., of Detroit, Mich., formerly of Cleveland, make a line of steam specialties which are characterized as being fully 50 per cent and in some cases 100 per cent stronger than other goods of a similar character. Among them is the Wright emergency steam trap, which we illustrate. This trap will dispose of an unusual inflow of water instantly and waste no steam. It is described as follows:

Three steam tight outlet valves are employed instead of one. These valves are placed at the top of the trap, as far removed from dirt, grit and sediment as possible. The water enters, filling the trap to the center of the float and forming a seal of four to six inches of water over the lower end of the outlet pipe, thus preventing the escape and waste of steam.

When thus filled, sufficiently to raise the float, one valve is opened slightly if there is but little water coming into the trap, but widely in event of a sudden inflow of water. This one valve is equal to the task of taking care of the water under ordinary conditions, but in event of water coming into the trap faster than



the one valve can discharge it, the water rises in the trap, carrying the float up with it and opening the second and third valve successively, if necessary. It will be observed that the discharge of each of these valves is continuous and that the action of the trap in emergencies is instantaneous.

There are many uses for these traps where the emergency feature renders it invaluable. Attached to a steam separator, it will, in event of an emergency, such as may never arise, but may arise at any moment, save the engine from disastrous and expensive wreck.

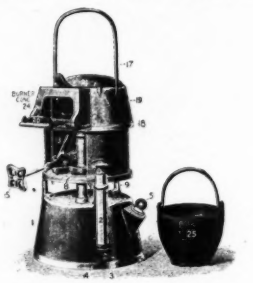
Attached to the steam jacket, it will not only keep it free from condensation, but will instantly take care of the cold water with which they are flooded for some purposes, thus saving steam and increasing the capacity of the press. It is the only trap that will do this and not waste steam.

It may be used with great economy in all factories having a large amount of condensation to dispose of, as well as in public buildings, where they prevent the flooding of radiators by relieving them of condensation immediately when steam is turned on, thus allowing them to heat at once.

The catalogue describing this and other steam specialties made by the company will be sent upon application if you mention "Domestic Engineering in writing.

SCHNEIDER'S TINNER'S FURNACE.

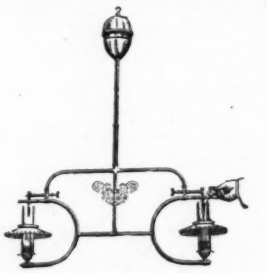
This illustration shows the Schneider & Trenkamp tinner's furnace known as the Reliable. A catalogue describing this



device will be sent upon application to the manufacturers at Cleveland, O., and we believe that our readers will be glad in knowing about this reliable furnace.

A SELF-LIGHTING LAMP.

The beauties of gasoline illumination are gradually being recognized by the trade and they have all come to see that a lamp is going to be judged by the time it takes to generate heat enough to change the gasoline into a gaseous form. The American Self-Lighting Lamp Co., of



Peoria, Ill., manufacture a lamp which they claim lights in one quarter the time consumed by others and requires only one match. It gives 100-candle power light for five hours at a cost of less than one cent. For years we have been anxious that detached houses and public buildings not having advantage of a public gas supply should be furnished with as good a light as a city dweller might secure. This lamp which we show herewith makes it possible. Upon application to the manufacturers, mentioning "Domestic Engineering," circulars and prices will be sent.

D. F. Durkin, Philadelphia, is plumbing a residence on Delancey Place, using Cooper's lavatories, baths, etc.—Adv.

NIAGARA FALLS ACETYLENE GENERATOR.

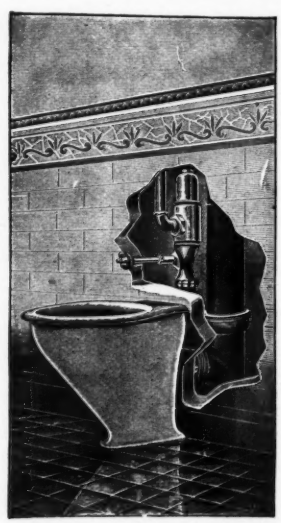
In adopting the name for their acetylene generator the Niagara Falls Acetylene Gas Machine Co., of Niagara Falls, N. Y., did not go far away from home, but adopted the name of the great falls and say that their generator, like the

falls, is powerful and never failing. It costs less than any, can be attached to any house, is automatic in action and forms a most attractive agency for master plumbers, who will find what they want to know by appling to the company, mentioning "Domestic Engineering."

Stradling Plumbing & Heating Co., Utica, N. Y., recently set Cooper's Nautilus closet in an operation they have on hand. —Adv.

A JAIL CLOSET.

This illustration shows the National enameled iron jail closet. They are simple, durable and easily adjusted and require no overhead tanks, and there are

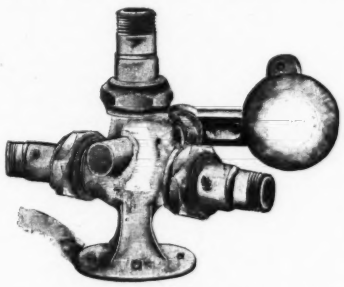


no movable parts exposed which can be tampered with. It is made by the National Supply Co., Toledo, O., who will quote prices if you mention "Domestic Engineering."

Ridgway & Tyer, Albany, N. Y., are plumbing a fine residence in that city, using Cooper's closets and other fixtures. —Adv.

THE STAR HOPPER VALVE.

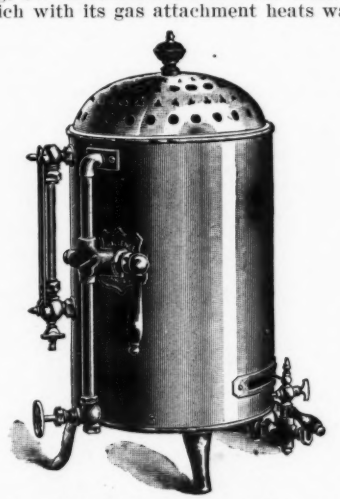
We illustrate herewith the Star hopper valve as made by the Crampton-Farley Brass Co., Kansas City, Mo. It wastes no water, the one straight stem sitting firmly with solid ball on inlet end and hollow ball on waste end, is controlled by



key stem or rock shaft to which the lever is attached. The action of this ball stem is in a straight horizontal movement and the fittings are so snug that rattling is impossible. The valve closes with the water pressure and is not affected by any variation in it. The hollow ball on the waste end of the stem travels two-thirds of the stroke with the port closed and takes up any slack that might occur in the seat chain, thereby preventing any waste of water through the soil pipe. The Metropolitan Water Co., of Kansas City, Mo., has tested this Star Hopper Valve for two years and when it was found to use no more water than a tank it was adopted and so rated. Upon application to the manufacturers prices will be sent on this very useful device, if you mention "Domestic Engineering."

CHALLENGE WATER HEATER.

At South Newark, Conn., the Challenge Mfg. Co. manufactures this water heater, which with its gas attachment heats wa-



ter to a high temperature with great rapidity and economy. It will boil water in 1½ minutes. Upon application to the manufacturers a catalogue will be sent if you mention "Domestic Engineering."

Webster, Harrigan & Reid, Detroit, are remodelling the plumbing in a residence in that city, using Cooper's Nautilus closets.—Adv.

CATALOGUE COMPILER.

J. D. Abraham, Bennet Bldg., New York City, makes a specialty of compiling catalogues and jobbers and manufacturers who are contemplating issuing catalogues should correspond with him.

BOSTON BRASS COMPANY'S BALL COCK.

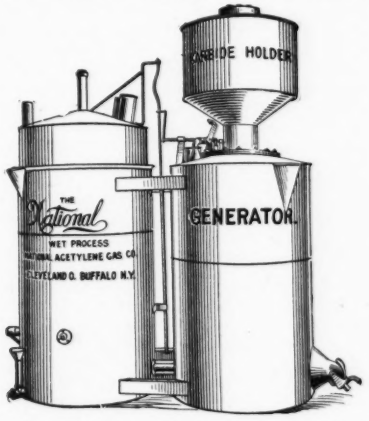
We show herewith a ball cock known as the B B, made by the Boston Brass Co., 36-40 Oliver St., Boston, Mass., which requires no special packing, which has a ground joint that is always tight, that has a rolling bearing lever on cam reducing the friction to the lowest amount. It will not hammer, sing or whistle. There

is only one packing which is easily removed. The seat is removable and is made of the best steam metal. Upon application to the manufacturers catalogues will be sent and prices made to the trade on this ball cock, which will be found to be especially profitable. Mention "Domestic Engineering," in writing. USE cut on page LII. fll

Powell Bros., Philadelphia, are plumbing the residence of Mr. Young on S. Broad street, using Cooper's closets, baths, lavatories, etc.—Adv.

A NEW NATIONAL ACETYLENE GENERATOR.

This illustration shows the new National, a machine which can be loaded with enough carbide to run thirty days or more without recharging. It does not produce after-generation when lights are turned off and it does not allow gas to escape when being re-charged. The carbide is



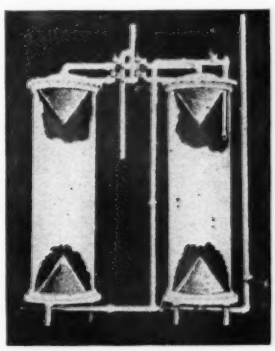
put into the water in a granulated form, insuring cool pure gas at all times and furnishing gas suitable for cooking purposes or running gas engines. Upon application to the Boston National Acetylene Gas Co., 17 State St., Boston, Mass., terms for local or general agents may be arranged.

A WELL KNOWN SIGN.

The cut which we show herewith has been before the trade so long that it instantly calls to mind Chas. Millar & Son Co., of Utica, N. Y., who are selling agents for the Utica Pipe Foundry. In addition to carrying in stock a complete line of pipe and specials for water and gas they are also large dealers of plumbers' and tinners' goods and manufacture lead pipe, solder, etc. Their catalogue will be sent upon application to those interested and it will be found to be an up-to-date book.

THE ECLIPSE FILTER.

We illustrate in connection with this item the Eclipse duplex filter made by the Eclipse Filter Co., Philadelphia Bourse, Philadelphia, Pa. This filter is easily and thoroughly cleaned with filtered water and does not require the use



of alum or other coagulents for purifying the water. Catalogue and other information will be sent upon application mentioninig "Domestic Engineering."

PLUMBERS' VISES.

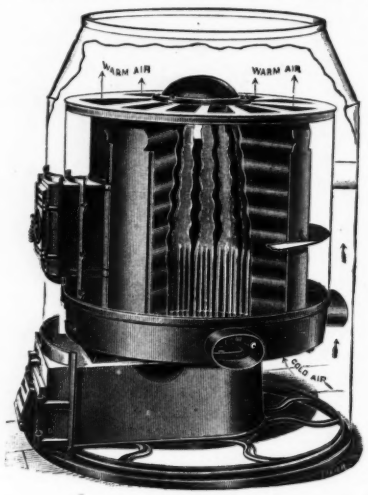
The combination pipe vise shown herewith is especially adapted to the use of plumbers and steam fitters. It is made

in six different sizes and every vise is guaranteed to be all right. It has a swinging bed with a fastening device under the bench. It is sold by all jobbers and plumbers and fitters should ask for the Parker vises. In case you do not succeed in getting them from your jobber write to Chas. Parker Co., Meriden, Conn.

UTICA PIPE FOUNDRY CO.

KELSEY WARM AIR GENERATOR.

We illustrate herewith the construction of the Kelsey warm air generator, which is built on correct scientific principles. Its most important feature is its sections of cast iron, which are made long, hollow, and with corrugated sides, placed upright on end in the generator on a lower deck and just above the grate surface. In each heater there are from 9 to 17 of these sections, according to the size. When in position they form the fire chamber. They are kept in position by the upper and lower deck rings and securely fastened with heavy iron rods. Around the sections are inside and outside casings. The inside casing of heavy iron confines and protects the combustion. Between the backs of the sections and the inside casing there is a space of four inches which furnishes the draft chamber. The outside casing is of galvanized iron lined with asbestos, and this in turn with tin. Between the inside and outside casings there is a space of three inches. This air chamber is open to the front air supply below and to



the warm air pipes above. The principle on which the heater is constructed is that the air is warmed by conducting it through the corrugated sections. The air is heated by being brought into actual contact with the heated surface and the corrugations add materially to the surface.

No other heater is constructed on this principle, and our readers will at once see the importance of it. A section of the Kelsey generator has 8 sq. ft. of heating surface and in a heater having thirteen sections there are, with the top and inside castings, 156 sq. ft. of heating surface. In the Kelsey there are 65 sq. ft. of heating surface to every square foot of grate suraface. There are a number of other very ingenious and important things in the construction of the Kelsey generator which are described thoroughly in a beautiful catalogue, which will be sent upon application to the Kelsey Furnace Co., of Syracuse, N. Y.

Schuler Bros., Wilkes Barre, Pa., have the contract for the Seager Office Building in Hazleton, in which they will use a large number of water closets, urinals, baths and lavatories, all the fixtures are Coopers.—Adv.

MARTIN CELLAR TRAP.

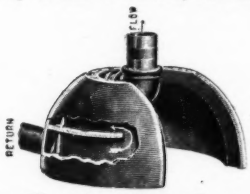
We show herewith an illustration of Emmett Martin's cellar trap which does not have any working parts and which prevents water from backing up into cellars or basements. It is not a back wa-

ter trap merely but is also a hand-hole trap and a cesspool. It has a deep water seal not affected by evaporation. The trap can be opened and cleaned. It can be put in any cellar. It has a 4 or 6-inch reducing plug, as shown in the illustration, and the soil pipe and trap is screwed into the plug. The trap can be atttached to the soil pipe by using a coupling. The small plug in the reducing plug is for the purpose of flushing the sewer if desired. It can be taken apart by any person without tools and can not be put together wrong as the parts will fit together in one way only. The main part of the trap is of heavy iron and the seat is of brass. It is made in two sizes, one for small cellars and one for store buildings. Upon application, mentioning "Domestic Engineering," Emmett Martin, of Ft. Wayne, Ind., will send discounts and price list.

COMBINED HEATING.

The two illustrations shown herewith are of the Stolz hot water boilers which can be placed in any furnace to heat by

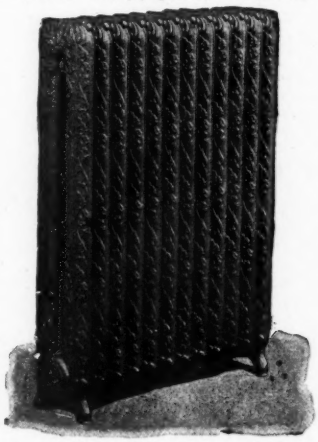
hot water portions of the building where hot air will not flow. They are made in from 100 to 600 feet of radiation capacity by Frank D. Stolz, 115 Lake St.,



Chicago, Ill., who will send upon application, mentioning "Domestic Engineering," descriptive booklets showing the application and sizes of these devices.

THE EXETER RADIATOR.

This illustration is of the "Exeter" radiator, made by the Gibson Iron Works, of Gibson City, Ill. It is made in five heights for steam or water. The design is a special one, with bold relief. This serves two purposes. It shows very



excellent foundry work and permits beautiful decoration. The makers claim the loops have all the radiating surface claimed for them, and that it is cast at just the right angles to secure the full heating effect. Upon application mentioning "Domestic Engineering," prices will be sent.

SCAIFE'S
Galvanized Iron Range Boilers.

Brazed Seams, Thoroughly Tested, Always Reliable.

Heavier, Stronger, More Durable Than Any Others.

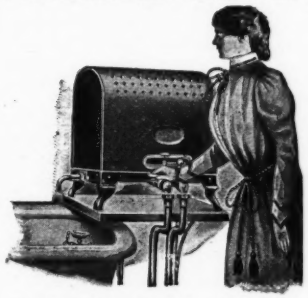
Localities having Severe Pressures should use only the SCAIFE BOILERS; they cost no more than others. Hundreds set in place over twenty years ago are still in use.
Complete Catalogue Mailed Upon Application.

WM. B. SCAIFE & SONS,
(Established 1802)
PITTSBURGH, PA.

Put it down in Black and White the
MONON ROUTE
IS THE DIRECT LINE BETWEEN
CHICAGO, INDIANAPOLIS, CINCINNATI AND LOUISVILLE
CITY OFFICE 232 CLARK ST., CHICAGO

SMALL BUT EFFICIENT.

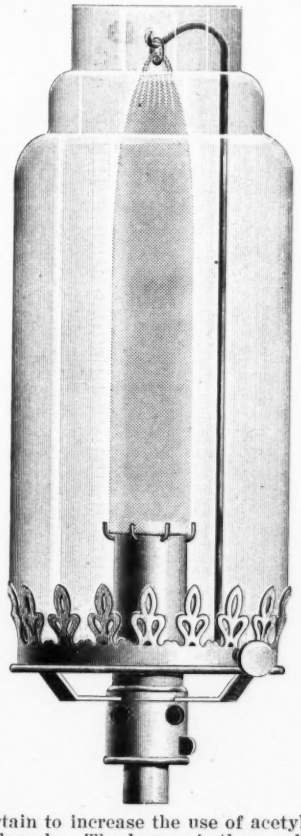
The Victor instantaneous water heater, shown in this illustration, is not a very large heater but it does the work expected of an instantaneous heater, and does



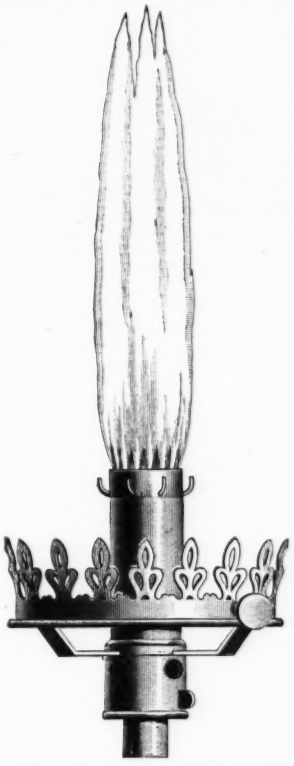
it well. Upon application to W. J. Adam, Joliet, Ill., a catalogue which will give the size, capacity and cost of this heater will be sent if you mention "Domestic Engineering."

A MANTLE BURNER FOR ACETYLENE GAS.

Acetylene gas apparatus manufacturers have felt the need of a mantled burner to use with acetylene gas, believing that this would complete the usefulness of this wonderful illuminant. The Atlantic Acetylene Burner Co., 179 Summer St., Boston, Mass., has now on the market a mantle burner for acetylene gas which



is certain to increase the use of acetylene very largely. The burner is the result of long and earnest efforts on their part to bring out a thoroughly satisfactory and successful mantled burner. The results produced are astonishing. By actual photometric tests their burner develops 950 candle power with a consumption of only one cubic foot of gas at a cost of less than one cent an hour. These results will place acetylene ahead of its rivals in the illuminating field. The burners are made in four sizes, ⅛, ¼, ½ and one foot of gas per hour. The mantles are made especially for acetylene gas and it is claimed they will last longer than ordinary mantles. It is also stated that the burner will positively never carbonize or clog. A sample burner without mantle or globe will be sent for $4. The price per dozen is $32 and a single mantle sells

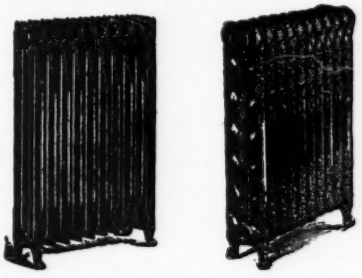


at 35 cents and a single globe at 25 cents. There are special discounts to the trade which will be furnished on application, mentioning "Domestic Engineering." We publish herewith two illustrations, one showing the burner with globe and mantle and one showing the blue flame inside the mantle.

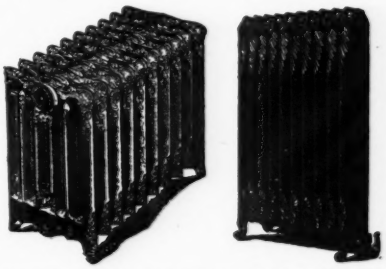
L. H. Mills, Bridgeport, Conn., has some alteration work on hand in which he is using Cooper's Nautilus closet.—Adv.

THE HOLLAND RADIATORS.

The steady growth of the business of the Holland Radiator Co., 38 Dearborn St., Chicago, Ill., is a matter of great satisfaction to the friends of J. E. Holland, the popular manager of the company. Their product has steadily in-



creased and its distribution has become very general during the past few years. The company manufactures four particular styles of radiators, the Bremen, Eclipse, Reliance and Unique. At their works at Bremen, Ind., every effort is made to construct a radiator which will satisfy the steam fitter who is to install it. No process of manufacture is omitted which will increase the character of the product or lower its cost. The company maintains offices and showrooms at 30 Dearborn St., Chicago, Ill., a Denver branch at 1759 Stout St., and has

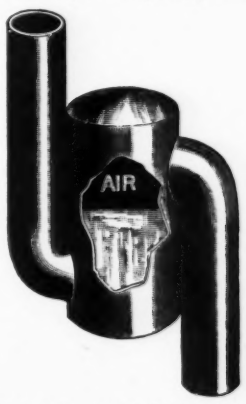


among its agents the United States Water & Steam Supply Co., Kansas City, Mo., and the Geo. Worthington Co., Cleveland, O. We cannot say enough about the character of the Holland goods or of the satisfactory manner in which they carry on their business. Only personal contact with the firm will demonstrate this to the fullest extent.

John C. Gunzer, Chestnut Hill, Philadelphia, has some nice work on hand, in which Cooper's Nautilus closet is being used.—Advt.

THE CLEAN SWEEP TRAP.

This old friend to the plumbing trade has had a very liberal patronage during the past year. The manufacturers endeavor to improve the character of their goods constantly. The principle on which



the trap is constructed does not need any improvement. Upon application to the Detroit Sanitary Supply Co., Detroit, Mich., mentioning "Domestic Engineering," prices and discounts of the Clean Sweep trap will be sent.

F. Schriver, Sr., Grand Rapids, Mich., has some alteration work on hand in which he is using Cooper's Nautilus closets.—Adv.

A SEVERE TEST OF SMOOTH-ON.

The Smooth-on Mfg. Co., Jersey City, N. J., has received a letter from F. A. Lawyer, an engineer of Savannah, Ga., which describes a test made of their "Smooth-on" which was of a very peculiar nature and which we think will be interesting to our readers. Mr. Lawyer states that in all fertilizer works they use what are called acid eggs. The acid eats holes into them very rapidly. In the Virginia Carolina Chemical Co.'s works they had an acid egg which had been thrown away as valueless because of the holes in it. A new one had been ordered

but its delivery was delayed and the company was about to get into a hole and suffer quite a loss. Mr. Lawyer had used "Smooth-on" several times for sand holes and fractures, concluded he could patch the old egg and save the company a few hundred dollars. He telegraphed for a 25-pound can of "Smooth-on" and repaired the old egg and it is now running under 60 pounds pressure, and has been for five months. The new egg, which has now arrived, has been laid aside for future use. The head chemist of the company said that the experiment would never win out. Two other chemists made the same statement. They showed by tests that the acid would eat the "Smooth-on" up. It did so in the dry state but after "Smooth-on" was mixed with water and put on in the usual manner and the cement set, the acid had no effect upon it. Some of the holes were as large as one's finger and went clear through the egg. The chemist said he had seen all kinds of ways tried to stop the holes in acid eggs but that this was the first one he had ever seen used a second time.

Henderson Thermo Steam Heater.

The accompanying engravings show the Henderson Thermo steam heater manufactured by the Prizer-Painter Stove & Heater Co., Reading, Pa. The general construction is the same as in the Henderson Thermo water heater and steam requirements are met by changes in the sections. In both heaters the sections are divided in the middle and extend only half way across the heater. This ensures freedom to expand and greatly reduces the liability of breakage. Each section is connected to a top header and to a water base. The sections are not connected to each other and any one may be easily removed without disturbing any other part of the heater. This is urged as a great advantage over sections which extend clear across the heater and are connected to each other. The connections are slip nipples of malleable iron, the castings being drawn together over the nipples by short bolts outside the waterways and away from the fire. These joints are easy to tighten, easy to take apart and durable. The top header is sunk beneath the upper ends of the sections and the sections connect to the sides of the water base. For convenience in handling and to ensure freedom from breakage the base is made in three castings, two sides and a back, connected by five-inch slip nipples.

The grate is of the rocking and dumping type, the number of grate bars corresponding to the number of heater sections. Three widths of the heater are made in which the grates are nineteen, twenty-eight and forty-one inches wide. The forty-one-inch grate is divided into two parts which are operated separately. By means of a pawl the rocking is limited to the movement necessary for ordinary shaking but by turning the pawl the bars may be turned upright and the contents of the grate dumped into the ash-pit.

The engraving shows the heater without the front section. The intermediate section has three horizontal waterways and the middle one forms the crown sheet. After striking the crown sheet the draft passes up through the vertical flues at the outside of the heater, then travels laterally between the tubes to the large central flue and then back to the smoke pipe. The tubes above the crown sheet are staggered so that the gases must follow a zigzag route while they strike the heating surfaces at right angles. The proportion of fire surface, flue space and grate area is exactly the same in all sizes of the heater. From front to rear of the heater the tubes are in straight rows and all surfaces are easily reached with a cleaning brush.

The upper part of each steam section is a liberating chamber, the water line being carried at about the middle of the gauge glass. An independent circulation of water takes place within each section and this is facilitated by diaphragms in the outer water legs which provide separate passages for ascending and descending currents.

A special feature is shown in the horizontal tubes inside the fire pot. These connect with openings in the front of the heater and bring in air which is heated in the tubes and discharged into the combustion chamber. It mingles with the burning gases and furnishes the oxygen which they require for thorough combustion, burning gases which would otherwise pass unburned to the chimney.

The manufacturers' catalogue No. 4, just issued, not only describes in detail the Henderson Thermo Steam and Water Heaters and shows many fine engravings, but is a book which should be read by every heating contractor for its suggestions and general information.

Wm. Waking, Richmond, Ind., is plumbing a residence in that city using Cooper's Nautilus closets with Atavic valve. —Adv.

Incorporates Supply Co.

The Engineers' & Steam Supply Co., of Minneapolis, Minn., capital stock $25,000, has been incorporated by Hubert Kelly, of H. Kelly & Co. Heating & Plumbing Co.; E. G. Walton, a prominent real estate man; John Nicol Smith, former manager of the H. Kelly Co.; M. F. Brynes and B. M. Kelly.

The firm will do a general jobbing business in engineers' and steam supplies and will be run entirely separate and distinct from the business of H. Kelly & Co., which will continue the same as in the past. Preparations for the opening of this business have been under way for two months or more and a complete stock of steam supplies, pipe and fittings are in warehouse in Minneapolis, ready for delivery on orders.

Messrs. Kelly and Smith will have the active management and with this pushing and progressive power back of it the new concern will certainly make its presence felt in the race for business. The policy of the firm will be the same as that of the H. Kelly Co., fair and honest treatment, legitimate profit on sales, first-class material and prompt delivery. The place of business will be at 225-227 3d street, South.

THE COSMO CAP MANTLE.

Readers of "Domestic Engineering" who have not yet become familiar with the Cosmo cap mantle should look it up. We show an illustration of it wherewith. It needs no adjusting, fits any incandes-

cent burner and by the screw on the base they are adapted perfectly to the burner on which they are used. It sells for 25 cents and all dealers can get a good discount from the manufacturers, The Cosmopolitan Incandescent Light Co., 176 E. Madison St., Chicago, Ill.

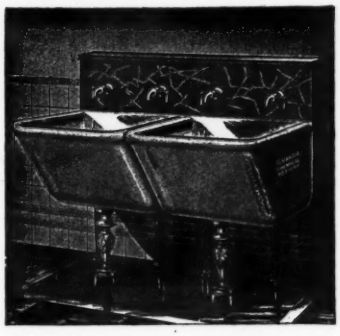
Carthey & Dumbeck, Salt Lake City, are plumbing the residence of Mr. J. B. Cosgriffe, using Cooper's Nautilus closets with Atavic valves.—Adv.

THE NAME OF ROSS.

The Ross Valve Co., of Troy, N. Y., make steam and water regulators and will be glad to have an opportunity to send their catalogue to any one who desires goods of this class. They also make a very superior organ motor which is doing satisfactory work in thousands of places in this country.

SOLID PORCELAIN WARE.

The Chas Graham Chemical Pottery Works, 986-1018 Metropolitan Ave., Brooklyn, N. Y., make a specialty of solid por-

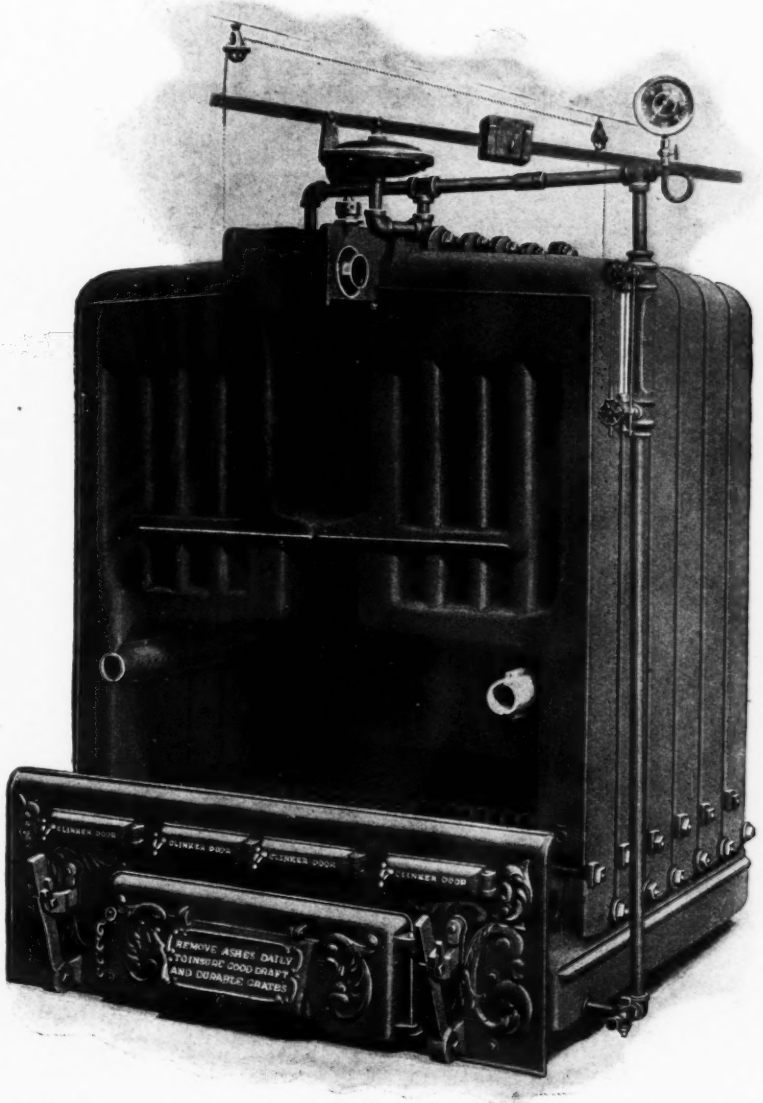


celain ware in the form of sanitary laundry trays, sinks, etc. We illustrate one form; others will be shown in a catalogue which will be sent upon application mentioning "Domestic Engineering."

Frank P. Hess, Philadelphia, is plumbing the residence of Mr. W. G. Loeffler on N. 9th St., using Cooper's lavatories, baths, sinks, laundry tubs, etc.—Adv.

A NEW FIRM, AND A LIVE ONE.

The Universal Sanitary Supply and Manufacturing Company is the name of a recently organized company which is building extensive works near New Castle, Pa., for the purpose of manufacturing sanitary specialties. The works are progressing rapidly under the personal supervision of the general manager, Mr. H. F. Weaver, and it is expected now that they will have their pottery products on the market by September first.



Following are the dimensions of the buildings, all of which are being built in a most solid and substantial manner:

Main building, 4 stories	150x40 ft.
Slip house	120x35 ft.
Biscuit wareroom	95x40 ft.
Biscuit kiln shed	95x40 ft.
Glost wareroom, 2 stories	95x40 ft.
Glost kiln shed	95x40 ft.
General wareroom	200x50 ft.
Power room	60x30 ft.

The company being located along the P. & L. E. and Pittsburg & Western railroads, has excellent shipping facilities. The clay for the pottery will be shipped from Missouri, North Carolina and other states at first, and in time local clay will be tried.

At first 150 hands will be employed, and in time the number will be increased to several hundred.

The pottery buildings are being constructed under the supervision of Matthew Platts, who will have charge of the pottery work. He is a man who has had years of experience in this line and hails from Trenton, N. J.

H. F. Weaver, the general manager, is a young man who has had wide experience in the lines he has been chosen to supervise, and is enthusiastic in the bright prospects of the new works. He comes from Connellsville, but was reared in Cleveland, where he received his first experience in business.

The officers of the new company are: President, Charles Kirk; vice-president, Edward King; secretary, George Pryor; treasurer, John W. Knox.

KIRTLEY DOMESTIC WATER SERVICE.

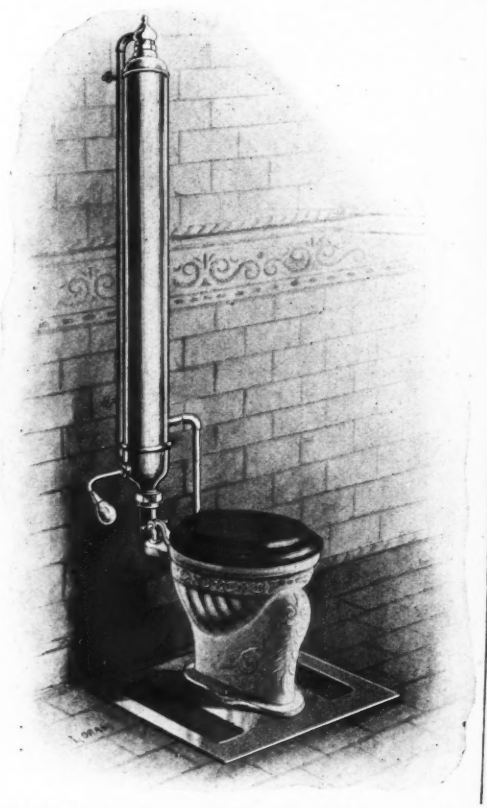
Geo. P. Kirtley & Co., 1213 Walnut St., Kansas City Mo., are just now very prominently before the trade because of the fact that Mr. Kirtley has been made secretary of the National Association of Master Plumbers. They manufacture the Kirtley domestic water service, which

is so arranged that houses not supplied with water from a public water works system can have plumbing put in in the most sanitary manner. A descriptive circular showing the apparatus will be found to be very interesting to all master plumbers who will write for it, mentioning "Domestic Engineering."

Hydraflush Patents For Sale.

A. M. Pasman, president of the Pasman Company, well-known plumbers, 426 Jackson avenue, Jersey City, N. J., has invented a hydraflush valve attachment for closets, which has been in actual use in several Jersey City homes for three years, and in that time not a repair has been necessary. The valve is patented in the United States and several foreign countries. Because of his inability to manufacture the article, Mr. Pasman has decided to offer his patents for sale. Attention is called to his advertisement in the monthly "Domestic Engineering," beginning with July number.

Plate No. 1 shows a sectional view of the Hydraflush—the handle, plunger, arms in each side, auxiliary valves, ball valve, air valve at top with telescopic connection to safety pipe, etc. The water flows in tank near bottom and as it ascends, air is expelled through valve at top until water reaches the small ball which floats and stops water.



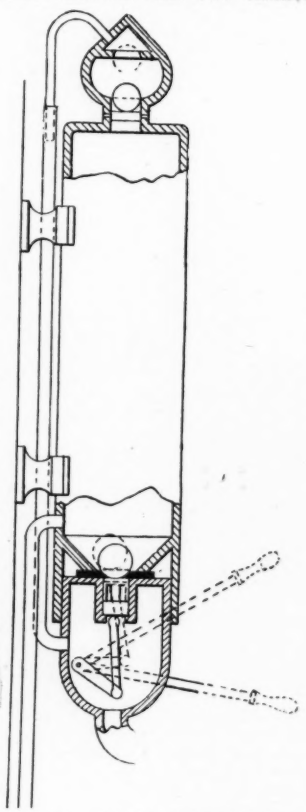
When the handle is raised the piston ascends, raising the auxiliary valves at side of ball valves, which relieves the pressure. The plunger continuing to ascend lifts the ball valve from oriface and it immediately floats to the surface, and the water flows from the opening in bottom.

The air valve at top, opening, allows air to enter tank and water to empty. When the floating ball descends and closes the oriface in bottom of tank, the tank refills. Five gallons of water is discharged each time. No special tank is required. The Hydaflush works with five pounds pressure and works equally well when connected with tank in building or in direct pressure.

Mr. Pasman will furnish full information and unsolicited testimonials upon application.

The Barrett Sewer Trap.

The illustration shows the entire construction of the Barrett sewer and tide trap made by Jas. Barrett & Sons, 48-50 Pearl St., Boston, Mass. The swinging gate prevents water or sewage backing up into the drainage system of the house. It will be observed that two cleanouts permit of access to either side of the trap. The trap has been used satisfactorily for fifteen years by the United States government. Upon application the manufacturers will send prices and discounts if you mention "Domestic Engineering."



Standard Water Meter.

The use of water meters in cities will some day be compulsory in any city of any consequence in this country. It is the only reasonable method of selling water. For cities who are contemplating the adoption of the meter system the Standard Water Meter Co., 26 Reade St., New York City, is in a position to quote some specially interesting prices on the Standard water meter.

The Dunning Boilers.

For a number of years the Dunning boilers for steam and hot water heating have had a reputation which has been very widespread and very excellent. The old reliable Dunning boilers are suitable for steam and hot water heating in any size of building. A new type has been placed on the market, however, which is called the Club Junior, which is intended for small houses and work of a smaller character. It is made for steam and hot water in four sizes. Their new catalogue will tell you all about it. Address New York Central Iron Works Co., Geneva, N. Y., and mention "Domestic Engineering."

H. Kelly & Co., Indianapolis, are remodelling the plumbing in a residence in that city using Cooper's Nautilus closets.—Adv.

The Vance Boiler.

In Geneva, N. Y., there are probably more heating boilers made in proportion to the population of the town than any other city of the United States. Among the prominent boilers made there is the Vance for steam or hot water heating, utilizing either soft or hard coal. The Vance Boiler Works claim to save 33 per cent in fuel as compared with other boilers. How they do this will be shown in a catalogue which will be sent upon application mentioning "Domestic Engineering."

Free & Black, Omaha, have some alteration work on hand in which they are using Cooper's Nautilus closets.—Adv.

Fit For a King's Library.

Something in the nature of a surprise awaits the blasè catalogue man when he opens the package containing the Western Tube Co.'s catalogue for 1901. A dark red morocco leather cover and gilt edges give it a prayer book appearance, and a copper plate engraving of the company's office buildings and works at Kewanee, Ill., just inside the cover, makes one think he is starting in on a work of art. The illustrations throughout the book are half-tone reproductions of photographs, showing the articles themselves in miniature—an advantage which the buyer will appreciate. The catalogue shows a complete line of wrought iron and steel pipe, cast iron and malleable iron fittings, brass fittings, brass and iron valves and cocks, radiators and coils and square and rectangular tubing.

Do You Need Gas Fixtures?

If so write for catalogue of Thayer Co., 1606 Chestnut St., Philadelphia, Pa., one of the largest gas fixture manufacturing concerns in the United States.

Quick Water Heaters

Not Quite Instantaneous

Price, $12.00 to $18.00

Large size has 8 square ft. heating surface

J. S. EMERY

1114 S. 15th Street TOLEDO, OHIO

THEORY AND PRACTICE OF

LEAD BURNING

By the Autogenous Process

OR HOW TO SOLDER WITHOUT SOLDER

With full instructions to the amateur in the details of the machine and the management of the gases, with valuable suggestions and directions for practice

BY AN EXPERT

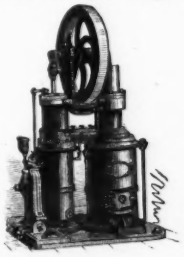
Every Plumber Should Have This Book

PRICE, BY MAIL, $1.00

Domestic Engineering, Chicago

HOT AIR PUMPING ENGINES

There are only two good Hot Air Pumping Engines which have stood the test of time. They are the



Rider and the Ericsson Engines

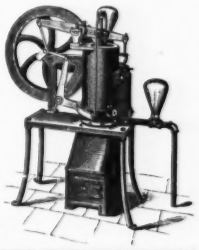
There is only one concern that has stood the test of time, and that is

The Rider-Ericsson Engine Co.

Every improvement suggested by our wide experience has been adopted. Send for Catalogue "A" to nearest office.

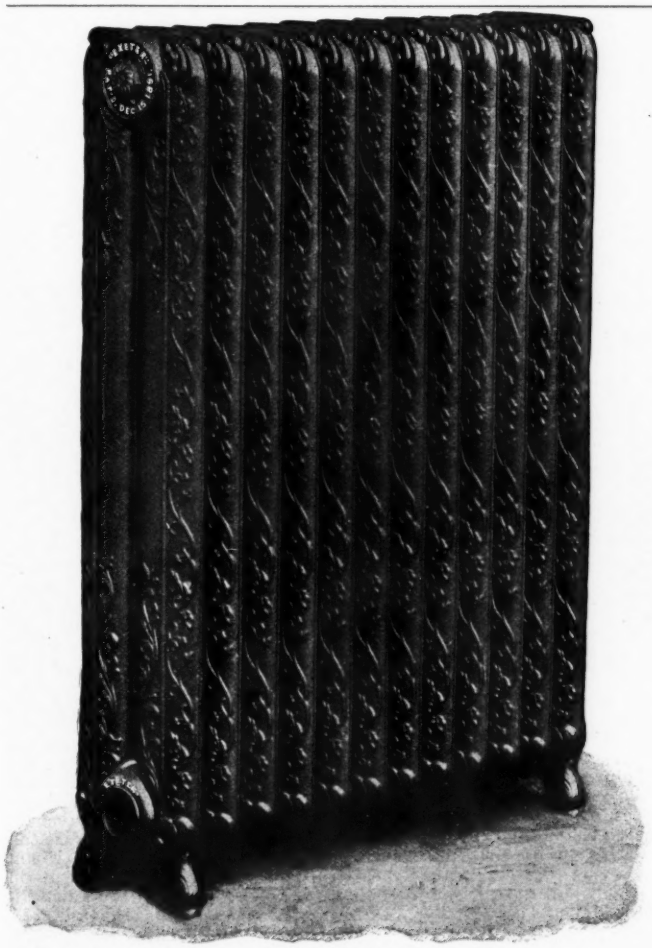
RIDER-ERICSSON ENGINE CO.

22 Cortlandt St., New York 40 Dearborn St., Chicago
239 Franklin St., Boston 40 N. 7th St., Philadelphia
692 Craig St., Montreal, P. Q.



Domestic Engineering

The Leading Journal of its Class



EXETER RADIATORS

Contain full heating surface claimed

Arranged to give greatest possible radiation. High art ornamentation in bold relief, showing finest workmanship.

Made in Five Sizes
for Hot Water and Steam

Prices upon Application

Gibson Iron Works

Gibson City, Ill.

A Handy Souvenir.

Messrs. Baker & Co., of Newark, N. J., whose reputation as metallurgists in platinum is world wide in its scope, are presenting their customers with a useful and attractive advertising novelty in the form of a dating stamp. It is a thoroughly "up-to-date" souvenir.

Quincy Plumbing & Heating Co., Quincy, Mass., recently installed Cooper's goods in a residence in that city.—Adv.

The Benedict Nickel.

The Benedict & Burnham Mfg. Co., of Waterbury, Conn., makes a pipe for high grade plumbing work which will never wear brassy because it is made of white metal clear through. When it is once put into a job of plumbing it will stay there forever and not get unsightly. It may be rubbed and rubbed and re-rubbed for years, it will always remain silvery white. Upon application to the manufacturers, mentioning "Domestic Engineering," an illustrated booklet describing this pipe will be sent.

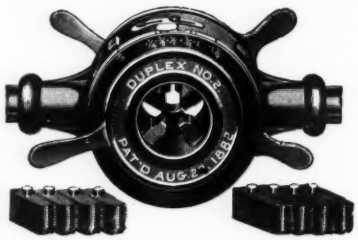
The Sedate Closet.

This is a low-down water closet combination manufactured by Haines, Jones & Cadbury, 1128 Ridge Av., Philadelphia, Pa. The tanks, seats and lids are made from very carefully selected hard woods well finished. The tanks are heavily lined with copper and all seams are locked and carefully soldered. The company recommends this closet to all who wish a high grade and highly perfected outfit. Upon application mentioning "Domestic Engineering" this and other styles will be described in the printed matter which they will send you.

Mr. Thos. D. Moore, Philadelphia, is remodelling the plumbing in the house of Mrs. Fox, on S. Broad street, using Coopers Nautilus closets, baths, etc.—Adv.

The Hart Stock and Die.

We show herewith the duplex No. 2 adjustable stock and die as made by the Hart Mfg. Co., 19 Wood St., Cleveland, O. These goods have come to be standard and a plumber or steam fitter scarcely considers his kit complete unless it contains one of these tools. A list of complete sizes and prices will be sent upon application mentioning "Domestic Engineering."



Oakum.

The Planet Mills Mfg. Co., 335 Carroll St., Brooklyn, N. Y., are manufacturers of oakum and are prepared to supply it in any quantity at the lowest market price.

A Baltimore Landmark.

The Jas. Robertson Mfg. Co., 30 Hanover St., Baltimore, Md., is one of the oldest houses in that section of the country manufacturing plumbers' goods and steam fitting supplies. They are prepared to quote prices upon anything in this line and would be glad to receive specifications mentioning "Domestic Engineering."

Rich & Marble, Hingham, Mass., have some alteration work on hand in which they are using Cooper's goods.—Adv.

The Alston Pipe Wrench.

The Alston Pipe wrench is manufactured by the Walworth Mfg. Co., 132 Federal St., Boston, Mass. It is strong and durable and releases instantly and comes in the same sizes and with the same list as the Stillson.

Mechanical Draft.

Walter B. Snow, of the engineering department of B. F. Sturtevant Company, Boston, Mass., is the editor of a practical treatise on the use of the mechanical draft of which a copy has come to this editor's table. The subject is treated exhaustively but entertainingly, the book being carefully tabulated. We do not know upon what terms the book may be had of the publishers, the Sturtevant Company, but if you will put yourself in communication with them, mentioning "Domestic Engineering," they will tell you now you may obtain this valuable work.

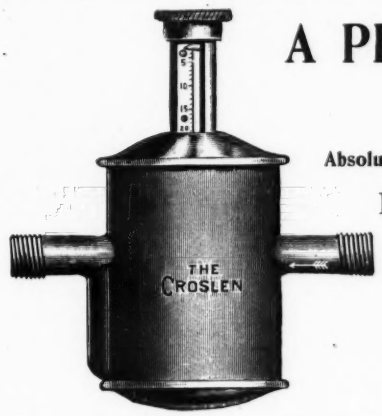
The Gurney Heaters.

Among the steam and hot water heaters which have been manufactured for years and which have made a place for themselves in the trade which is non-contestible, the Gurney stands prominent. We show only one form of these heaters. There are several other types adapted for different purposes. The principle on which the Gurney Heater Mfg. Co. does its business is that, if every heater turned out by them and placed by their agents does its work satisfactorily, there will be no question whatever as to the continuation of the increase of their product, consequently they make their heaters so that they will recommend themselves and each one placed will secure another order. Upon application to the Gurney Heater Mfg. Co., 74 Franklin St., Boston, Mass., a catalogue showing the complete line of boilers and radiators manufactured by the company will be sent if you mention "Domestic Engineering."

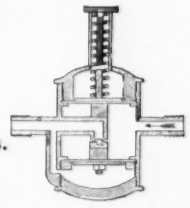
Geo. H. Beasley, Canton, Mass., is remodelling the plumbing in a residence in that city using Cooper's goods.—Adv.

Busy in Grand Forks.

Grand Forks, N. Dak., July 2.—Spriggs Bros., plumbing and steam heating contractors, have secured the following contracts: Plumbing in C. C. Gowran's new residence; plumbing in A. I. Widlund's residence on South Fourth street; plumbing in Geo. A. Wheeler's residence on Cottonwood street; plumbing in C. E. Garvin's residence on Eighth avenue; steam heating in three houses for J. M. Carroll on University avenue; steam heating and plumbing in new Kalispel hotel at Kalispel, Montana; steam heating and ventilating apparatus in eight-room school building at Minot, N. D.; hot water heating in C. D. Lord's residence at Park River, N. D.



A PRESSURE REGULATOR THAT CANNOT LEAK



Absolutely no friction. No Stuffing Boxes. No Sliding Parts or Packings.

High pressure balances itself. Pressure of spring opens valve. When back pressure in low pressure chamber balances the spring, valve closes. **Made for Air, Gas, Steam or Water.**

CROSLEN MFG. CO.

119-121 La Salle St., CHICAGO, ILL.

The CHEAPEST, BEST and ONLY

CELLAR TRAP

MADE.

A perfect Back Water Trap, Stench Trap and Catch Basin combine.

Manufactured by

Emmett Martin, Fort Wayne, Ind.

The Duffy "No-Flud" Back Water Stop

STOPS THE WATER BACKING UP through basement and Area Drains and prevents foulgases arising from the sewer. No Erratic Rubber Balls or swinging metal Gates which are unseated by Sediment, Paper or Matches.

IT NEVER DISAPPOINTS

For Sale by the plumbing trade generally. Made by

E. S. DUFFY MANUFACTURING CO.

Not Incorporated. 6438 Wentworth Ave., Chicago

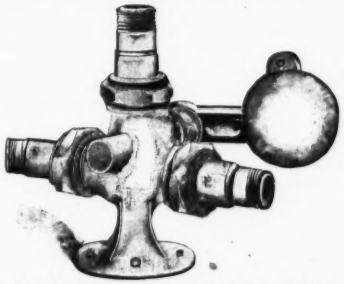
INVENTION FOR SALE
ALTPETER'S
ALUMINUM SOLDER
Hard and Soft Solder, also a process to solder copper, brass and other metals to aluminum
Samples shown. No solder for sale
758 S. Halsted St.
CHICAGO
L. F. ALTPETER, JEWELER

DOMESTIC ENGINEERING

IS THE LEADING TRADE JOURNAL DEVOTED TO PLUMBING, HEATING, LIGHTING AND VENTILATING.

Star Hopper Valve

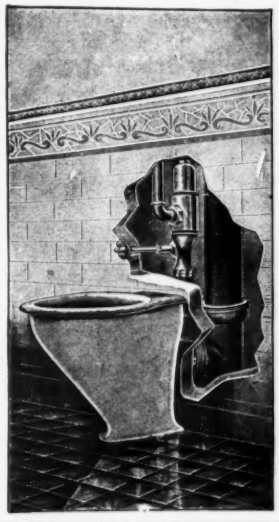
GET THE BEST, IT'S THE CHEAPEST



The above cut is an exact representation of the Star Hopper Valve, which we claim possesses more desirable points than any other Valve on the market. It wastes absolutely no water, the one straight stem setting firmly with solid ball on inlet end and hollow ball on waste end, is controlled by key stem or rock shaft to which the lever is attached. The action of th s ball stem is in a straight horizontal movement and the fittings are so snug that rattling is impossible. The Valve closes with the pressure and is not affected by any variation in same. This hollow ball on the waste end of stem travels two-thirds of the stroke with the port closed, takes up any slack that might occur in seat chain, th reby preventing any waste of water passing through the soil pipe. The Star Hopper Valve was tested for two years by the Metropolitan Wat r Company, of Kansas City, Mo., and found to use no more water than a tank closed, it was then adapted and rated as a tank closed. The Star Hopper Valve is the most durable Valve on the market and will not require fifty cents for repairs in five years.

Crampton-Farley Brass Company

KANSAS CITY, MO.



National Enameled Iron Jail Closet

Simple, durable and easily adjusted. No overhead tanks required. Cannot be tampered with—no movable parts being exposed.

MANUFACTURED BY

The National Supply Company

TOLEDO, OHIO

A Titan in the Field.

The William Powell Co., Cincinnati, O., are just putting on the market a new improved lever throttle valve, something far superior to anything they have ever made. Their old U. S. and Star throttles are not to be compared to this new "Titan."

The construction is entirely different from the former makes. A slight movement of the lever releases the disk, so it requires no strength whatever to operate the valve. A child can move it as readily as a man.

They make a heavy valve, "Giant" pattern, for pressures up to 350 pounds, in exactly the same style.

Following are some claims of the Powell Company for the Titan:

They close positively.
They open and close with perfect ease.
They do not stick or jam.
They are simple in construction.
They are very durable.
They are easily repaired when worn.
They are cheapest because the best.

By reference to the cuts: A is the body or shell, B is the spindle, C is the carrier, terminating in a tapering wedge D, F-F are two links loosely coupled to the carrier at its upper end, while the lower ends of the links engage the studs of the disks E-E. It will be seen that the wedge D gets in its work upon the disk studs only as the rotation of the spindle reaches a dead center in the downward stroke. The reverse movement of the carrier, it will be noted, first lifts the wedge from between the disks before the latter begin to move, then, as the disks fall loosely away from their seats, they are carried up to full openings, absolutely without friction on the seats. This is the secret of the whole matter.

The Washer Man.

Andrew Bell, of Newark, N. J., should be known in the trade as the great and original washer man. Mr. Bell's sole work is manufacturing washers. He does this so well and has such a complete line that he is looked upon as headquarters for this class of goods in the United States. There is no style of washer that he is not prepared to manufacture and quote prices on. In writing him kindly mention "Domestic Engineering."

The John Ritchie Plumbing & Heating Co., Toronto, have a contract on hand in which they are using Cooper's Nautilus closets.—Adv.

Getting Into Ship Shape.

R. Williamson & Co., whose factory and show rooms at 109 Randolph street, Chicago, were wiped out of existence several months ago by fire, have practically recovered from the effects of that disaster and are now fitting up elegant quarters at 52 and 54 Lake street, near State, for the display of their gas and electric fixtures Part of their commodious store will be partitioned off into apartments, tinted in different colors and furnished so as to give the prospective buyer an exact idea of how the different styles of fixtures will appear when set in the home. The work of putting up the immense assortment of fixtures which the company carries on hand will require several weeks yet, but when completed the display will be most effective.

Headquarters for Lights.

J. P. Fink, 551 Pearl St., New York City, has for many years been the leading manufacturer of clusters and other forms of lighting apparatus for office buildings, churches, stores, etc. Upon application mentioning "Domestic Engineering" catalogues will be sent.

Water Lifts.

L. E. Rhodes Co., Hartford, Conn., make a specialty of water lifts and will be glad to send their catalogues of such devices upon application mentioning "Domestic Engineering."

Chas. W. Coombs, Lawrence, Mass., has a contract on hand for plumbing a fine residence in that city, using Cooper's closets, baths, lavatories, etc.—Adv.

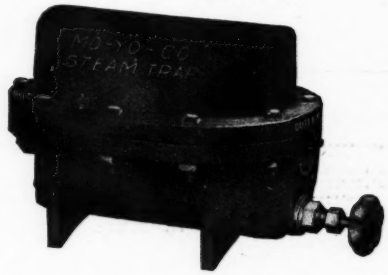
Contemplate New Factory.

The Croslen Manufacturing Co., 119-121 La Salle street, Chicago, find business so much on the increase that in the near future we may expect to hear of their purchase of a new factory. Several new orders of late have rendered this step imperative. A neat little folder has just been issued describing the Croslen system of automatic pressure regulators.

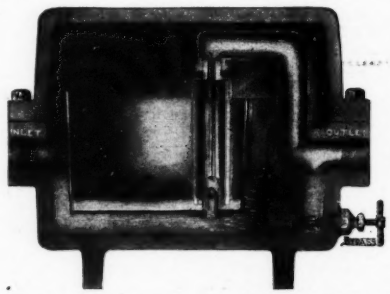
Henry Jackel, Philadelphia, is remodeling the plumbing in the residence of a prominent citizen, using Cooper's closets, baths, lavatories and other fixtures.—Adv.

Mo-Yo-Co Steam Trap.

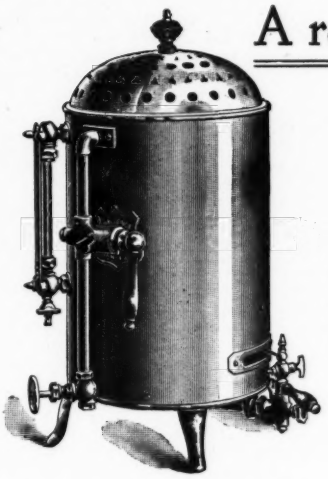
The accompanying cuts illustrate the exterior and interior view of a new steam trap known as the "Mo-Yo-Co," manufactured by the Monash-Younker Co., of Chicago. The construction of this trap is far different from anything of its kind on the market. The cover can be taken



off and the interior of the trap removed, if this should become necessary, without disconnecting the trap from the steam pipes. The working parts of the trap are so constructed that there is absolutely no friction in any of its parts, therefore it is not liable to stick or get out of order. The trap, as you will notice, has an open bucket and as the water accumulates in the trap the bucket fills and sinks, thereby opening the valve and causing the water to discharge. It has a by-pass arrangement so that when first turning on steam you can relieve the trap of the surplus water. It has no closed floats,



cams, diaphragms or expansion plugs. It will take care of pressure ranging from 15 lbs. to 150 lbs., and is built on the most modern, practical, scientific and common-sense principles. The manufacturer will be glad to furnish you with blue prints and detailed information if you will address them, mentioning this journal.



A record breaker

Boils water in
1½ minutes

This heater with gas attachments for heating water to a high temperature with unequalled rapidity and economy cannot be surpassed by any heater on the market. Adapted for bath rooms, etc. Send for catalog.

Challenge Mfg. Co.
South Norwalk, Conn.

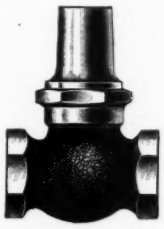
POWHATAN

Our Specialty

Is a staple line of brass cocks and valves for gas, steam and water. We aim to make these goods so that they will please the user. We sell them so that the jobber can make some money on the deal. We make a style of high grade right and left stop and waste cock with detachable handle that is a winner.

Powhatan Brass & Iron Works
CHARLESTOWN, W. VA.

Lock Shield Valve



For Gas

BRASS AND IRON GOODS

For Water and Gas Connections

PLUMBERS' SUPPLIES

J. B. CAMPBELL BRASS WORKS.
ERIE, PA.

Lock Shield Floor Valve

For Gas

Here's an "Eye Catcher"

IT'S A CUT—one of the sort of illustrations we are making every day for advertisements, booklets, catalogues, etc. We make them in half-tone or line, from photographs, drawings, or direct from the articles. We have a plant and a force that give our customers great advantages in quality, time and cost.

Send for Specimens and Prices.

The Standard Engraving Company
Incorporated
Seventh and Chestnut Streets, Philadelphia, Pa.

Brass Fittings.

The Hamlin & Emery Brass Co., 26 Island St., Boston, Mass., manufacture and carry in stock a very large and complete line of brass fittings. They say if you cannot find what you want anywhere else, they always have it. Their line is from ⅛ to 6 inches and includes all reducers. Upon application mentioning "Domestic Engineering" their circulars will be sent.

J. E. Hoffer is plumbing the residence of Wm. Davis using Cooper's baths and other fixtures.—Adv.

Something Out of the Ordinary.

J. B. Campbell Brass Works, of Erie, Pa., have completed their catalogue "A" of brass and iron goods for water and gas connections and plumbers' supplies. The book is unique in at least one feature—the color of paper on which it is printed. This is of the bright goldenrod hue, which characterizes all of the Campbell stationery. The reader's time is saved by extreme brevity in presenting the claims of the goods and by an arrangement which makes it possible to find any article in short order without turning to the index. Another feature is a condensed discount table which enables one to see at a glance at what figure goods must be sold to give any desired profit. A strong phrase in the introduction is: "The articles we manufacture are our best salesmen."

House Pumps.

A most important line of plumbing goods is manufactured by A. Y. McDonald & Morrison Mfg. Co., Dubuque, Ia., in their line of house pumps for kitchen sink use. We illustrate Fig. 52. These pumps are adapted to a variety of purposes and are constructed as a compact and powerful hand force pump. They

are very handy for house use in forcing water into an upper story or storage tank. They are made of iron, brass lined, or all brass. Upon application the manufacturers will send circulars showing complete line and prices. Please mention "Domestic Engineering" when writing.

Success of Vapor System.

The Vapor Steam Heating Co., of York, Pa., report greatly increasing success in installations of Broomell's Vapor System of Heating.

The new S. A. L. Hotel at Hamlet, N. C., Messrs. Gresham & Jamieson, proprietors, has adopted the system, using a No. 1201 heavy duty Gurney boiler with about 3,500 square feet of Gurney direct radiators.

The Mr. J. W. Tufts, of Boston, Mass., has placed order for the vapor system, in connection with high pressure plant, for his hotel building at Pinehurst, N. C.; this order requiring 14,000 square feet of radiation.

Mr. Joseph McNamee's and Mr. Arthur Wright's residence at Atlantic City, have recently been equipped with the vapor system. Capitol boilers and American Radiator Co.'s radiators were used in both houses and the Currie Hardware Co. of Atlantic City installed both jobs.

Mr. John J. Daly, of No. 3036 Germantown Ave., Philadelphia, has completed vapor system in Mr. Geo. Lorenz's building, 44th and Chestnut Sts., and in Dr. Chas. T. Adams' house, 57th St. and Girard Ave., using Reliance boilers, Triton and Solus radiators and Imperial wall coils in both houses.

Mr. J. W. Marshall and Mr. Wm. Chalfant, Jr., have each had vapor system placed in their residences at West Chester, Pa. Capitol boilers and Rococo radiators were used in both houses, and the work was done by Mr. Geo. F. Oat.

Messrs. Hersh & Bro., of Allentown, Pa., have placed vapor system in Mr. Henry Hersh's residence, using Richmond boiler and Rococo radiators.

Messrs. Shafer & Willenbecher Bros., of Allentown, are placing vapor system in Mr. Geo. Schwartz's residence at Hancock, Pa., using Abendroth Bros. series "B" boiler and Pierce, Butler & Pierce Co.'s Touraine radiators.

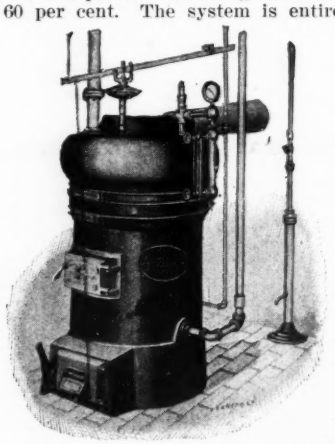
Messrs. Dettmer & Handwerk of Slatington, are placing vapor system in Mrs. Mary Jones' residence there, using Pierce, Butler & Pierce Co.'s Florida boiler and Bremen radiators.

Pipe Coverings.

Readers who desire a line of pipe coverings either magnobestos, hair felt, or mineral wool will find it very much to their advantage to correspond with Robert A. Keasby, 83 Warren St., New York City, mentioning "Domestic Engineering."

The Trane Vacuum System.

Jas. A. Trane Vacuum Heating Co., of La Crosse, Wis., guarantee by this system to save 25 per cent in fuel. The official test placed the saving at from 25 to 60 per cent. The system is entirely



automatic and noiseless in its operation. Such a thing as an explosion is an impossibility. The illustration shows the application of the system to an ordinary steam boiler, and the company will be glad to give other information upon application, mentioning "Domestic Engineering."

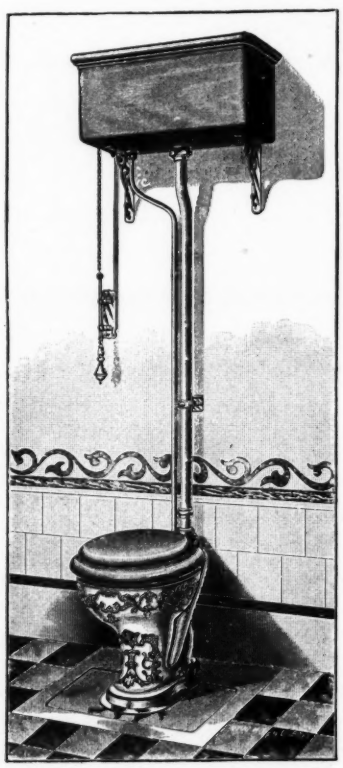
The Vincent Quick-Opening Valve.

We illustrate herewith the Vincent quick-opening valve which can be locked immediately. This valve has an adjustable wedge which characterizes the Vincent valves. The wedge has one side rounded which makes it adjustable to any wear on the other side. In the Vincent wedge valve it takes but little pressure to release the wedge. This reduces the friction and wear to a minimum and

produces a valve which will open when under pressure. By the wedge being adjustable there will be no opportunity for displacement. Upon application sheets showing the various patterns of valves made by Sweet & Doyle, Cohoes, N. Y., will be sent if you mention "Domestic Engineering."

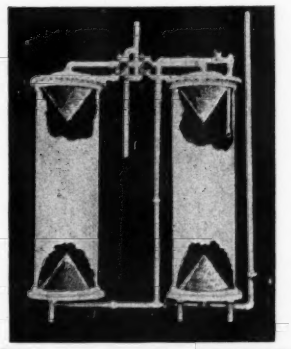
The Diamond Water Closet.

We show herewith the Diamond siphon jet water closet with roll rim. A beautiful, clean and sanitary fixture made by F. N. Dubois & Co., 243-247 9th Ave., New York City, who manufacture the McClellans anti-siphon trap vent, lead pipe, lead



traps and all kinds of plumbers' materials. Upon application, mentioning "Domestic Engineering," catalogue and prices will be sent.

THE ECLIPSE DUPLEX FILTER



Easily and thoroughly cleaned with Filtered Water.

No Alum or Coagulent used for Clarifying

Send for catalogue and hundreds of references on the best filter made in the U. S.

ECLIPSE FILTER CO.
Philadelphia Bourse

WE CAN SAVE YOU MONEY

Cooper's Adjustable Drain Trap

Has a 4-inch Seal and is an absolute protection against Sewer Gas. $1.75 to $2.00 SAVED ON EACH TRAP. Write and we will show you how to make money.

Libbey, Parker & Co., - Boston

Sales Agents for Libbey Drip Valve, Victor Ball Cock and Victor Brass Pipe Hanger.

H. B. OLMSTEAD & CO.

PLUMBERS' CABINET WOOD WORK

Largely increased facilities for the manufacture of SEATS, CISTERN BOXES, DRAIN BOARDS, LAVATORY CASES, etc., etc.

PATTERN AND MODEL MAKERS

CORRESPONDENCE INVITED

Office and Showroom
87 Frankfort St., New York
Telephone, 1041 John

Factory
663 Manhattan Ave., Brooklyn
Telephone, 540 Greenpoint

SOMETHING NEW

Vanderman's Adjustable Fitting for Connecting Soil Pipe

Send for Catalogue and Price List of Plumbing and Heating Specialties, or order through your Jobber.

Freight allowed on the Adjustable Fittings, East of the Mississippi river, on a dozen of one or assorted sizes.

MANUFACTURED AND FOR SALE BY

THE VANDERMAN PLUMBING AND HEATING COMPANY
Willimantic, Conn.

S. P. STAMBACH. ROBERT LOVE

Stambach & Love

Plumbing Supplies and Sanitary Specialties

50 AND 52 N. SEVENTH STREET
PHILADELPHIA

THE WILHELMI | THE MODERN

TWO BEST BOILERS

The "Wilhelmi" is a high-grade copper range boiler tested to 250 pounds and guaranteed to stand a working pressure of 150 pounds. There can be no better boiler made.

The "Modern" is for use where the pressure does not exceed 100 pounds, as that is the guaranteed working pressure. It is tested to 200 pounds.

BOTH BOILERS GUARANTEED NOT TO LEAK AND AGAINST COLLAPSE

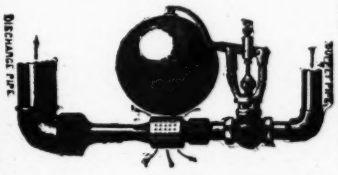
Very attractive Discounts Furnished

For Sale only by Jobbers of Plumbers' Supplies

HAYES MFG. CO., Paterson, N. J.

Automatic BRAENDER'S CELLAR DRAINERS

Operated by Water or Steam Pressure.



It is the Best, therefore the Cheapest

It is used in Municipal and U. S. Government Departments, endorsed by leading sanitary experts, and is guaranteed to do all that is claimed for it. Write for circulars and testimonials.

Sales Agents: W. N. McKenna, 73 Chestnut St., Boston, Mass.
J. E. Douglass, 40 Dearborn St., Chicago.

Sold to the Trade Only **PHILIP BRAENDER** 47 W. 125TH ST. NEW YORK.

A New Pottery.

The first department to be completed at our works will be that in which we will make a full line of

STAPLE SANITARY POTTERY

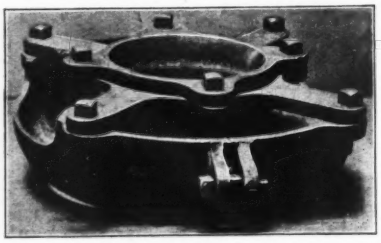
We will have ware on the Market September 1, and will quote on any staple or specialty. We will sell to the jobbing trade only, and solicit orders.

Manufacturers of Plumbers' Specialties.

Universal Specialty Mfg. Co.
NEW CASTLE, PA.

A Clever Chicago Device.

Geo. F. Ryan & Co., 3811 Cottage Grove Ave., Chicago, Ill., manufacture this special joint for use between iron soil pipe and earthenware sewer pipe which prevents the broken connection

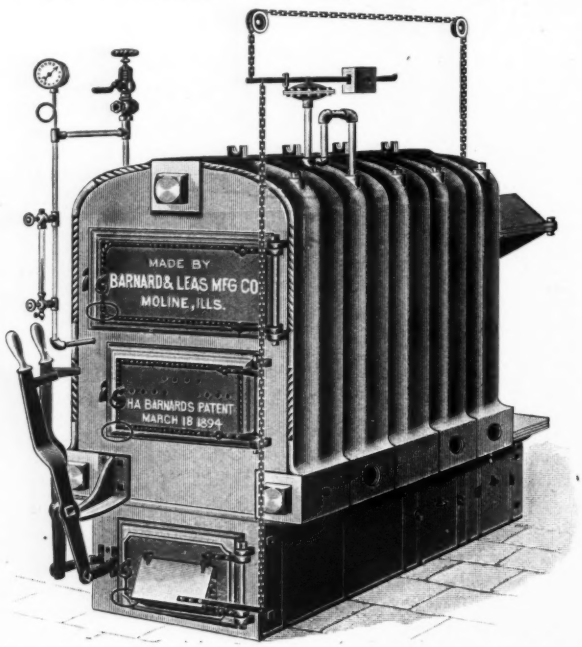


which is so often the source of trouble at this point. It keeps the sewer gas absolutely out and replaces the cement joint which has so many objections when used in this part of the house drainage system. Upon application they will be glad to tell you all about it.

D. F. Keefe, Watertown, Mass., recently installed Cooper's Nautilus closets in a residence of that city.—Adv.

The Barnard Boiler.

We show in this illustration the Barnard boiler set up for use with asbestos jacket. It can also be brick set, if desired. The efficiency of these boilers has



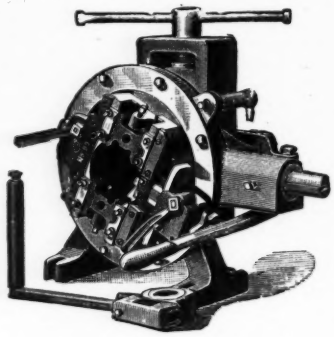
been proven by a long period of usefulness. The manufacturers have never had a word of complaint from any of their boilers after sending them out. They are simple in construction and easy to operate. The boiler is made as nearly perfect as the best material and high grade mechanical skill can make them. A very handsome catalogue will be sent upon application, mentioning "Domestic Engineering," addressed to the Barnard & Leas Mfg. Co., of Moline, Ill.

Soil Pipe.

If you are prepared to buy soil pipe in car load lots we would recommend that you write to the Birmingham Pipe and Casting Co., Birmingham, Ala., for prices, mentioning "Domestic Engineering."

The Armstrong Tools.

The Armstrong Mfg. Co., Bridgeport, Conn., who manufacture this pipe threading and cutting off machine sell a very large variety of machines for similar purposes in different styles and sizes. One of the features of the Armstrong machines on which the manufacturers lay special stress is that work can be done



more quickly than with most others, as they are especially made to save time and labor. They are manufactured for hand or power purposes with a capacity of from ¼ to 6 inches. They also make pipe wrenches, pipe vises, adjustable stocks and dies, etc. Upon application, mentioning "Domestic Engineering," catalogue will be sent.

Do You Want Tubing?

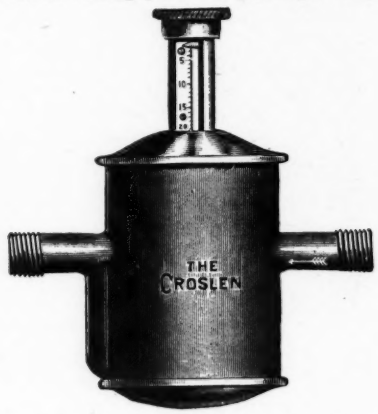
If you are in need of wrought pipe and will tell the size and amount you need to F. K. Bowes & Co., 1605 Great Northern Bldg., Chicago, they will quote strictly low prices. They carry over twelve thousand tons in stock. Mention "Domestic Engineering" in writing.

Now Make Porcelain Enameled Baths.

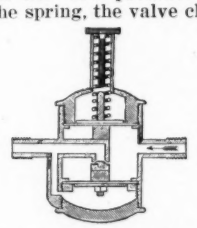
Henry McShane Mfg. Co., of Baltimore, Md., are now making a line of porcelain enameled baths, sinks, and lavatories. Upon application catalogue E will be sent which fully describes these goods. Please mention "Domestic Engineering."

A Non Leaking Pressure Regulator.

The accompanying illustrations show a pressure regulator that cannot leak. There is absolutely no friction, no stuffing boxes and no sliding parts for packings. High



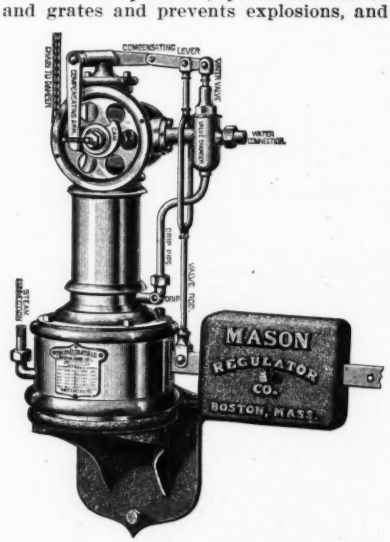
pressure balances itself; a pressure of spring opens the valve. When back pressure in the low pressure chamber balances the spring, the valve closes. This



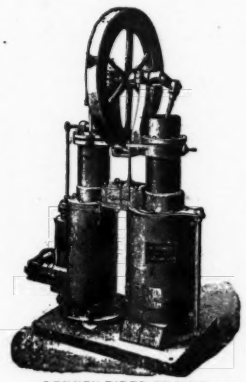
regulator is made for air, gas, steam or water by the Croslen Mfg. Co., 119-121 La Salle St., Chicago, Ill., who will be glad to send circulars upon application if you mention "Domestic Engineering."

A Fuel Saving Damper Regulator.

The Mason Regulator Co., of Boston, Mass., manufactures this hydraulic damper regulator, which will save 10 per cent of the fuel bills. It guarantees an even steam pressure, preserves boilers and grates and prevents explosions, and



will control one boiler or a whole battery. It is illustrated in their catalogue which describes all the Mason regulating devices of different types which are standards on the market and which will be sent upon application, mentioning "Domestic Engineering."



DENNEY RIDER ENGINE

DENNEY IMPROVED
RIDER & ERICSSON
HOT AIR PUMPING ENGINES

The most Reliable and Economical Engines for pumping water Use any kind of fuel. Can be operated by any one. Perfectly safe, Noiseless, and Always ready for service. Important Improvements Patented and NOT FOUND in any OTHER MAKE of engines. Send for catalogue and testimonial list.

BUILT FOR YEARS BY

American Machine Co.
Wilmington, Del.

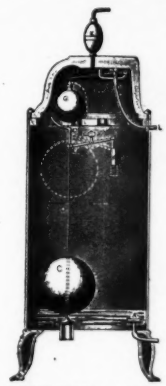
The Victor Supply Co.

Manufacturers and Jobbers of

Plumbers' Gas and Steam Fitters' Supplies

Write for Prices when in the Market.

Springfield, Ohio



PATENTED DEC. 4, 1894
PATENTED OCT. 15, 1895

Philadelphia Says It is the Best Beer Pump Made——

And our pamphlet tells why it is the only beer pump sold in town where it's made. We make attractive terms to our agents. Write us.

I.X.L. Pump Company

1015 Christian St., Philadelphia.

Self-Acting Hopper Valve

Very simply constructed. Has only one flat washer on inside. Repaired easily with pair of plyers. Does not hammer. Waste drains whole body of valve. Cannot waste when running. We give a very liberal discount to the trade and want agents.

The G. McG. Mfg. Co.

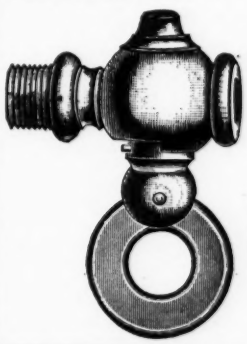
The G. McG. 1015 Christian St., Philadelphia, Penn.

Reliable Plumbers' Furnace

We have added valuable improvements to our Reliable Furnace. We have substituted a handy and durable pump in place of rubber bulb. Pump will be found far superior to bulb in many ways. It not only makes furnace more compact, but is also much handier and perfectly reliable at all times. It is an automatic air pressure furnace, producing a very power fulblue flame, and is indispensable for both shop and out sidework for either tinner or plumber. Write for catalogue.

SCHNEIDER & TRENKAMP CO., Cleveland, O.

Balls, Bodies, Binding Posts, Bushings, Caps, Cocks, Nozzles, Gas Stove Fittings, Nipples, Swings, Screws, Nuts, Wire Connectors Electrical Goods Etc., Etc. SPECIAL TURNING TO ORDER.



United Metal Mfg. Co.

525-527 Broome Street, New York

Manufacturers of

Gas, Electric and Combination Fittings

FROM BAR METAL

WATER SUPPLY WITHOUT WATER MAINS

The Kirtley Patent Domestic Water Service supplies country, village and suburban homes, business and public buildings with water supply where water mains are not accessible. Greatly increases a plumber's chance to do business. Write for descriptive circular.

GEO. P. KIRTLEY & CO., 1213 Walnut Street, Kansas City, Mo.

INTERNATIONAL SPRINKLER CO.

517 ARCH STREET, PHILADELPHIA, PA.

PRES., CLARKE MERCHANT
(Pres. of Merchant & Co., Inc.)

COMPLETE INSTALLATIONS MADE

"International" Head

THE BEST

The Company has a *complete equipment* for both the WET AND DRY SYSTEMS of Automatic Fire Extinguishers.

Its devices are fully protected by the U. S. Patent Office; and have the *full endorsement* of the *Insurance Companies*.

The "International" Head is in all respects the *best* on the market.

It is the *simplest, most reliable, most certain and most effective*. From *20 to 70 per cent. of cost of insurance saved* by putting "International" Sprinklers in your *foundry, factory or store*.

Write for full particulars.

THE DUFF DRILLING ATTACHMENT.

We show herewith two styles of the Duff hand drill attachment. Fig. 1 shows what is known as style A, which is intended to take standard one-half inch round shank drills. Fig. 2 shows style B which is fitted with a universal jaw and will take either round or square shank drills. A socket for square shank drills is also made which fits into style A drill. With one of these a hole can be drilled in less time than is required in getting

ready to use a ratchet drill. Friction is overcome by ball bearings. Danger of breaking small drills when the point gets through the piece is prevented by a screw set which is always under the perfect control of the operator. A three-fourths-inch hole can be drilled with less effort than a quarter-inch hole can be made with other drills. With other drills the operator has to push against the drill in order to make it cut but with this drill he does the feeding with the hand screw. It is very useful for resetting valves without removing them from the pipe. Upon application to the Duff Machine Co., of Lowell, Mass., mentioning "Domestic Engineering," a set of cards showing these drills more fully will be sent.

O'Toole Bros., Clinton, Mass., have some fine contracts on hand in which they are using Cooper's goods.—Adv.

RUBBER SPECIALTIES.

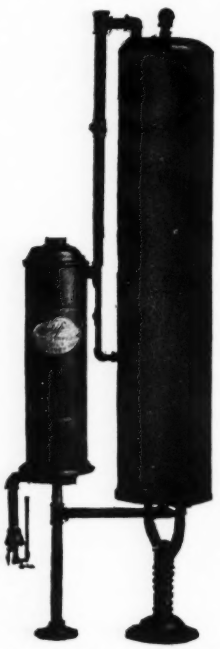
H. O. Canfield, Bridgeport, Conn., is one of the largest manufacturers of plumbers' rubber goods in the world. There is no specialty which he manufactures for which he is not headquarters. His catalogue, which will be sent upon application if you mention "Domestic Engineering," illustrates and prices 36 different items. It is very important that manufacturers of plumbers' specialties in which rubber parts are used should place the manufacturing of these parts in good hands.

In making moulds for manufacturing rubber specialties of various shapes, about the same general principles are involved as in making patterns for the iron founder. Care must be exercised to insure the ready removal of the rubber from the mould after vulcanizing, and the shrinkage of the stock, due to contraction when cold, must also be taken into account.

The greater the number of pieces made at one vulcanization the less the cost per piece. This fact has a direct bearing on the proper size of moulds. We suggest, for this reason, and on account of the nicety with which moulds should be made, that customers allow H. O. Canfield to make them, instead of obtaining them from parties who do not understand or appreciate how they should be constructed. His machine shop is equipped with the most modern machinery, the most skilled mechanics are employed, and he can make moulds quickly, at low cost, and of a character adapted to mould rubbers most economically and of the highest finish.

WATER HEATING MADE EASY.

The heating of water for domestic uses will always be of great importance to master plumbers and will be a source of great profit to them constantly. The conditions of modern life are making it increasingly necessary to have large quantities of hot water, and master plumbers who pay attention to this kind of trade will find that it will respond very well to a little persistent energy. You should



write to the Eclipse Gas Stove Co., of Rockford, Ill., for their new catalogue describing the Eclipse round water heaters, one of which we illustrate herewith in its application to a range boiler. This heater shows 35 per cent to 50 per cent more efficiency than other styles. A specially constructed burner placed under the pipes causes the heat to pass up the entire length of the pipes, about 25 inches, spending its entire heat forces in its ascent. This heater is made in four styles and all of them efficient and beautiful. When you write, mention "Domestic Engineering" please.

DO YOU WANT PATENTS.

Readers of "Domestic Engineering" who are thinking of taking out patents will find a reliable firm of attorneys in W. T. Fitzgerald & Co., 8th and F Sts., Washington, D. C. When writing them will you have the kindness to mention "Domestic Engineering"?

TO TAKE PLACE OF PREVIOUS LISTS.

Crane Company, Chicago, have issued a circular giving lists, dimensions, etc., of flanged fittings and gate valves for steam pressure up to 125 pounds. The measurements have, in some cases, been changed, so that it will be necessary to have this circular at hand in making plans for piping. They can be had upon request if you mention "Domestic Engineering" when writing.

TO INSULATE UNDERGROUND PIPES.

The A. Wyckoff & Son Co., of Elmira, N. Y., have on hand orders for four car loads of their water proof patent steam pipe covering for shipment to North Carolina for insulating the underground pipes in central heating plants. This article is said to be the only one made that will insure perfect results in a system where hot water and steam are conveyed long distances underground, either for heating or power purposes, and is being largely used throughout the United States.

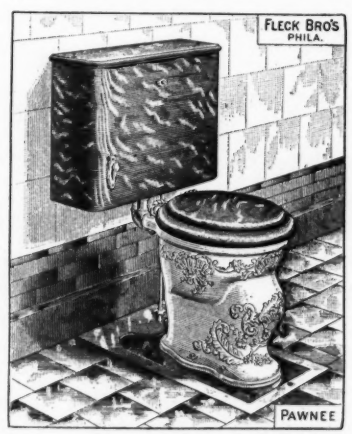
THE BORDO VALVE.

The Bordo Valve Co., of Coatsville, Pa., manufacture this plug valve which is especially adapted for boiler blow-off and high pressure service. It is made in all sizes and responsible persons can secure a sample on 30 days' trial and booklet will be sent by manufacturers describing the interior construction of the valve,

which is very ingenious, upon application mentioning "Domestic Engineering."

THE PAWNEE WATER CLOSET.

This illustration shows the low-down siphon hopper with jet made by Fleck



Bros., of Philadelphia, Pa. It roughs in at 12 inches. This is but one of a large assortment of low-down closet combinia-

Eagle Stills Sell Well

They look well, work well, wear well—better than others that cost more and do less. Sanitary. Self-purifying. Automatic. Simple. Three parts – retort, distillate reservoir and condensing dome. Skeleton pattern handles. Nickel-plated faucets. 9 inches high, 15 in. diameter.

TWO STYLES.

No. 9. Best Rolled Sheet Steel, heavily coated idside and outside with pure block tin, weight 3¼ pounds—$5 retail.

No. 11. Best Hard Rolled Solid Sheet Copper, pure block tin lining, weight 6 pounds—$8 retail.

Liberal Profit for Plumbers. Write

Health & Comfort Supply Mfg. Company
CINCINNATI, OHIO

SALOON WORK PAYS

Write for terms to agents. Territory free.

AND THIS

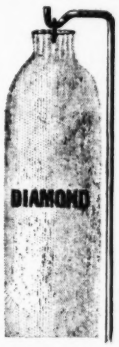
FOUNTAIN BEER COOLER

pays very good profit. It can always be sold to saloons newly installed and old tin coils, nasty and unhealthy, can be replaced by it. It is porcelain enameled inside and out, and is perfectly adapted to draw cool, clean and fresh beer.

THE SEITZ BEER COOLER MANUFACTURING CO.
PEORIA, ILLINOIS.

DIAMOND MANTLES

HAVE NO EQUAL



Investigate their merits and you will have an advantage over the dealer who uses any other make. Our chemist has had twenty-one years experience and in the "DIAMOND" has evolved the greatest efficiency possible in a mantle, a pure white incandescence of great candle power, equally good for gas or gasoline.

Diamond No. 1, . .	$12.50 per hundred
Diamond No. 2, . .	10.00 per hundred
Diamond High Pressure No. 1,	18.00 per hundred
Diamond High Pressure No. 2,	16.00 per hundred

Small orders, cash with order. Money refunded if goods not perfectly satisfactory. SPECIAL DISCOUNT TO JOBBERS

OMAHA MANTLE MFG. COMPANY
1319 DOUGLAS ST., OMAHA

THE ONLY SANITARY WASTE

THE PURITY BATH & BASIN WASTES

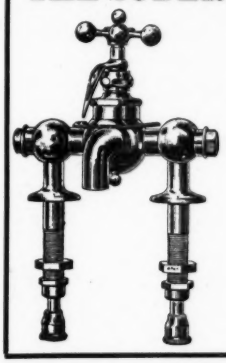
cut off the water in the Bowl or Bath from direct contact with the FILTH IN THE OUTLET PIPES.

Opens or closes with a touch,
Simple in construction,
No parts to get out of order.

FOR FULL PARTICULARS ADDRESS

THE H. M. WEAVER CO.
MANSFIELD, OHIO
New York Office: No. 81 Fulton St.

THE SODERLUND TWIN FAUCET



A COMBINATION HOT AND COLD WATER FAUCET WITH BUT ONE HANDLE. FOR BATHS, LAVATORIES AND SHOWERS.

Its features Cannot leak; practically self closing; always operates; simple; indicator shows temperature of water being drawn; gives full force of pressure; serviceable; sells on sight.

For prices write

UNION BRASS WORKS
11 Hawkins Street
BOSTON MASS.

The McGuire Adjustable

ROOF FLANGE

No. 1. will adjust from ¼ pitch to ½ pitch
No. 2. will adjust from flat to ⅓ pitch

Made for Standard and Extra Heavy Pipe in copper and Galvanized Iron. Only two sizes to be carried in stock as the adjustments fit all angles.

For Prices, etc., apply to

KENDRICK VALVE AND WASHER COMPANY,
SYRACUSE, N. Y.

The above cut shows our No. 1, ¼ to ½ pitch

Billings Pipe Bender

Patented September 24, 1889
Invaluable to Plumbers—Saves Ten Times Its Cost Every Month. Send for Prices.

This device is a **Specially Shaped Spiral Spring** made from **Crucible Steel** wound tapering to one end so as to be easily withdrawn, and having a loop at the other to hook into when the bend is to be made in a long piece of pipe. The Bender placed inside of the pipe, supports and prevents the pipe from flattening or collapsing while being bent. By the use of it lead pipe, and copper, brass or steel seamless tubing may be quickly and easily bent. It is as easy to form opposite or double curves, such as goose necks, as a single bend.

We carry in stock ¾, 1, 1¼, 1½, 2, 2½ and 3 inch Benders.
Special sizes on demand.

The Billings Pipe Bender Mfg. Co.
38 Park Place and 33 Barclay Street NEW YORK CITY

CHAS. THACKARA, Pres. W. F. DUFFIELD, Treas. ELIAS HOGELAND Secy.
ESTABLISHED 1842.

THACKARA M'F'G. COMPANY,

ELECTROLIERS,

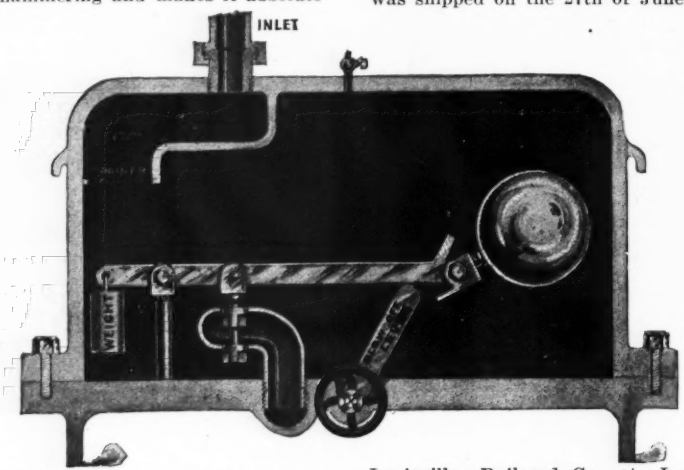
GAS AND COMBINATION FIXTURES,

1606 Chestnut Street, Philadelphia.

tions made by this firm who will be glad to quote prices upon application mentioning "Domestic Engineering."

ECLIPSE BACK PRESSURE VALVE.

We illustrate herewith the eclipse back pressure valve, manufactured by the John Davis Co., 51-79 Michigan St., Chicago, Ill. This valve is a two-seated valve provided with an air cushion which prevents hammering and makes it absolute-



ly noiseless. It can be used either on a vertical or horizontal pipe and fitters are requested to compare its price list with the price list of other noiseless valves. Upon application, mentioning "Domestic Engineering," price list will be sent.

THE CHICAGO AIR & WATER VALVE.

We show herewith a valve for steam and water radiators, which combines these mechanical principles of perfection:

1. It will free radiators and coils from all air.
2. It absolutely prevents water leakage.
3. The air chamber and separate partition empties valve from water and it will not water-log.

4. Expansion part is protected from injury and can be renewed at slight cost. This insures the durability of the valve. The valve is absolutely automatic in action and has been severely tested and after having been in use a number of years gives perfect satisfaction. Address for prices and discounts, the Chicago Air & Water Valve Co., 31-33 S. Canal St., Chicago, Ill., mentioning "Domestic Engineering."

HOT WEATHER DOES NOT CHECK BUSINESS.

Although Mr. G. M. Davis of the Davis Regulator Co., 106 N. Clinton St., Chicago, is at his summer home at Delavan, Wisconsin, trying his new boat, his absence does not mean a cessation of business. June has been an exceptionally prosperous month and all records have been broken. A 26-inch relief valve was shipped on the 27th of June, to the Louisville Railroad Co., at Louisville, Ky. Four ten-inch regulators are soon to be shipped to Pittsburgh.

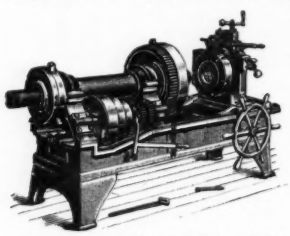
A STRAIGHTWAY BACK WATER GATE.

The Iron Sanitary Mfg. Co., 52-54 Dearborn St., Chicago, Ill., make this straightway back water gate together with a large number of other styles with accessible sewer flushing fittings. These resist back water pressure. Each fitting has an iron inspection manhole to the surface so that the location of the sewer is always known and is accessible with-

out disturbing the floor or concrete. It has a tight but removable cover. The fittings are flushed by hose or may be connected to the main water supply so that water may be turned on and the entire house drain may be flushed. A catalogue showing this and other styles will be sent upon application mentioning "Domestic Engineering."

PEERLESS PIPE CUTTER.

We show herewith the Peerless No. 4 improved pipe cutter for power, made to cut from one inch to four inches in size. The company manufacture threading and



cutting machines which will cut from ⅛ inch to 18 inches and adopted for hand or power purposes. The machines are reliable and will do rapid work. Upon application to the Bignall & Keeler Mfg. Co., Edwardsville, Ill., prices will be made if you mention "Domestic Engineering."

Geo. F. Uber & Co., Philadelphia, have secured the contract for plumbing the Levy Office Building in that city.

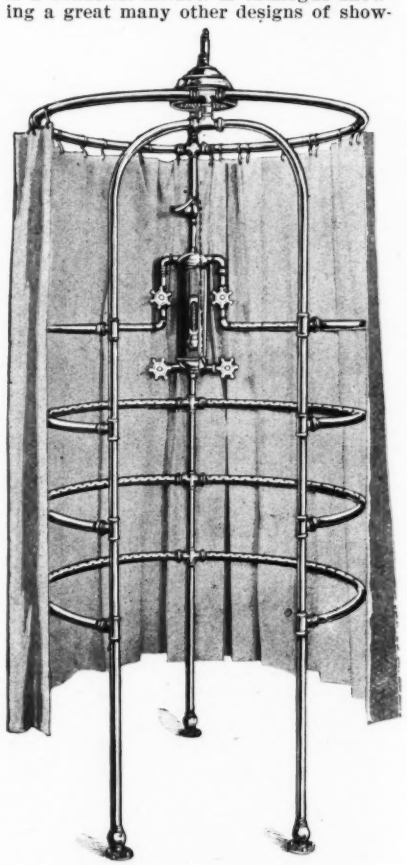
THE NO-FLOOD WATER STOP.

We illustrate a very simple device made by E. S. Duffy Mfg. Co., 6848 Wentworth Ave., Chicago, Ill., for preventing ingress of water through the basement and area drains. It also prevents foul gas arising from the sewer There are no rubber balls or swinging metal gates to this

water stop, so it can not be unseated by sediment, paper or matches. The plumbing trade will welcome this unique device which will be described very thoroughly upon applicatiion to the manufacturers if you mention "Domestic Engineering."

A BEAUTIFUL SHOWER.

The fixture which we illustrate herewith is made by the Street & Kent Mfg. Co., 109 S. Jefferson St., Chicago, Ill., and is a beautiful fixture. A catalogue showing a great many other designs of show-



ers which are made by the same company, they will be glad to send upon application mentioning "Demestic Engineering." The company make a specialty of making shower baths to order and will duplicate any shower you happen to have seen and taken a fancy to.

THE LEONARD CLOSET REPAIR

Read what the Trade say;

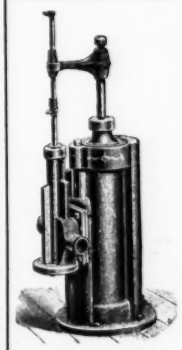
"I am pleased to be able to highly recommend it after giving it a thorough trial. It certainly fills a long felt want, because it will fit any closet. It is simple, strong and durable and I have failed to find one leak after first putting it in place."

F. L. PORTER, CHICAGO

Sold by Plumbing Supply Houses. Send Sixty Cents for Sample.

GEO. B. LEONARD

216 East Forty-first Street, Chicago.



WATER ENGINE FOR BLOWING PIPE ORGANS

Water Motors

for all kinds of power.

Also Gas Engines

Chicago Water Motor & Fan Co.

216 Lake Street CHICAGO, ILL.

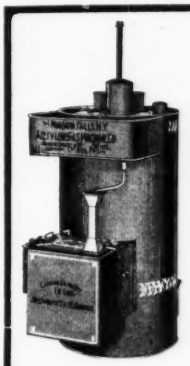
THORIUM

and other

Mantle Chemicals

J. MARSCHING & CO.

27 Park Place **New York**



Write for Terms

The Niagara Falls Acetylene Generator

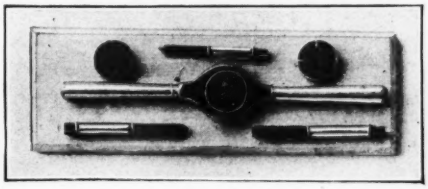
Like its patronym, **Powerful and Never Failing.** Costs less than any; attached to any house-piping; automatic in production. Really the best for agents.

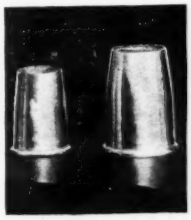
Niagara Falls Acetylene Gas Machine Company.

NIAGARA FALLS, N. Y.

Handy Andy Float Rod & Sink Bolt Set

We make all sizes of Brass Ferrules, Standard and Ex. Heavy. Prices on application.



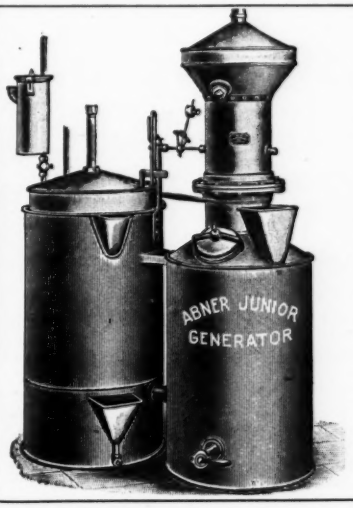


This set comprises tap and dies, and die Holder, sizes ¼-24, ¼-18 Sink Bolt size, and 8-30. Very handy in repairing Float Rod, cutting bibb screws, etc. Sent prepaid, $1.66.

AMERICAN DISTRIBUTING COMPANY, SYRACUSE, N. Y.

MANUFACTURERS OF PLUMBING SUPPLIES

H. ROMEYN SMITH' PRES. H. P. THOMPSON, REP.



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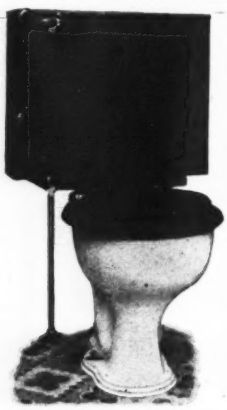

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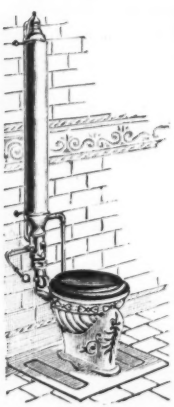

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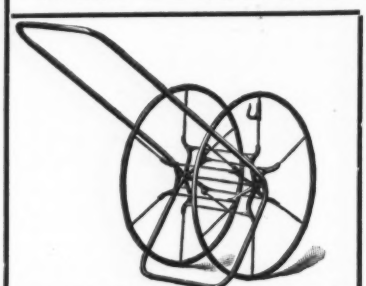

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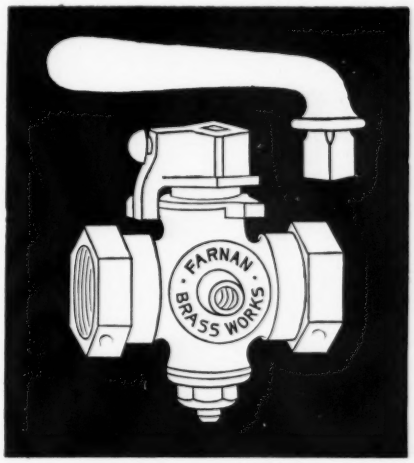

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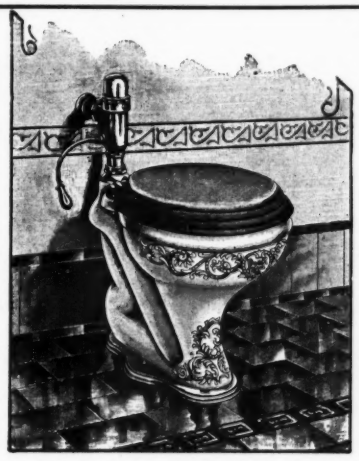

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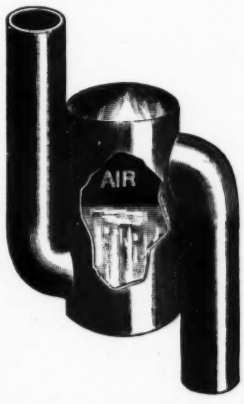

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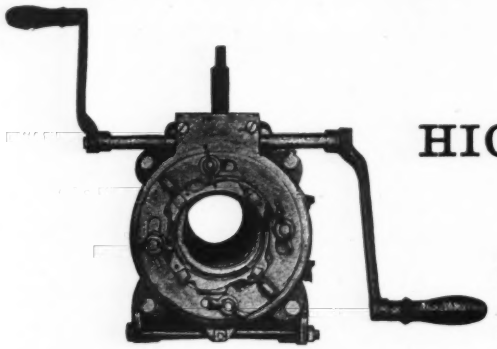

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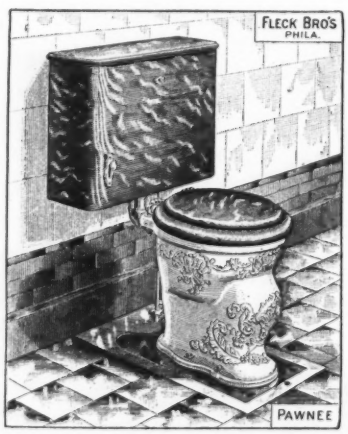

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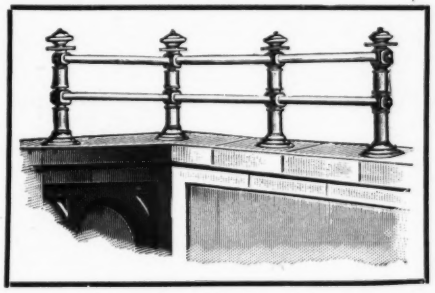

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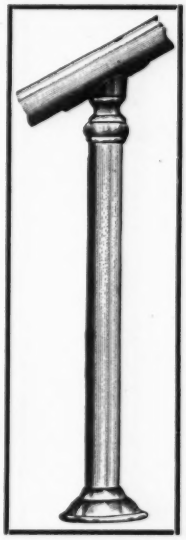

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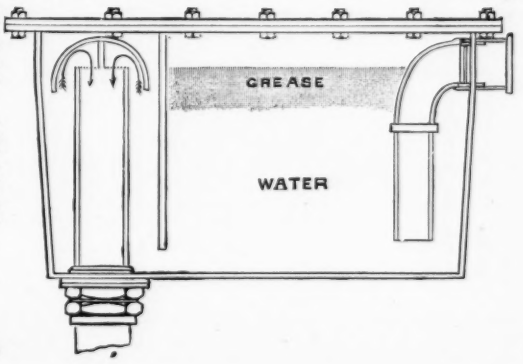

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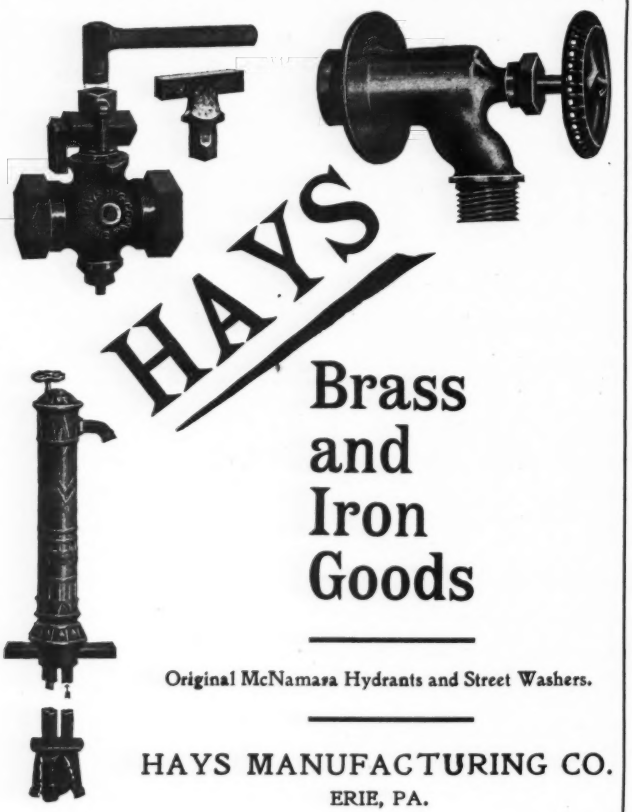

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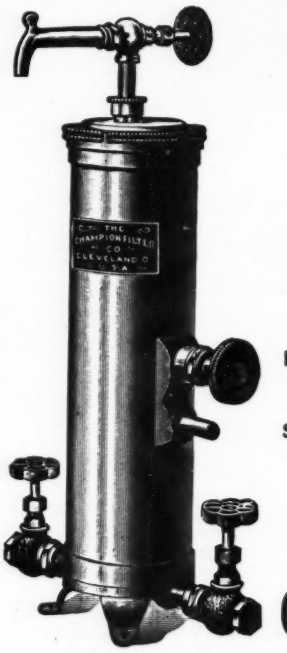

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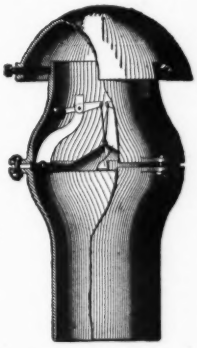

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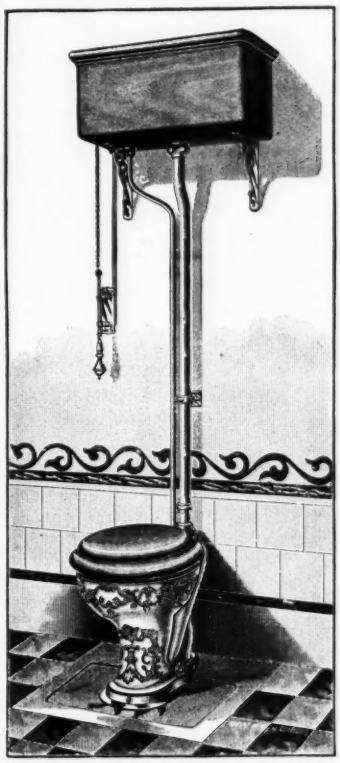

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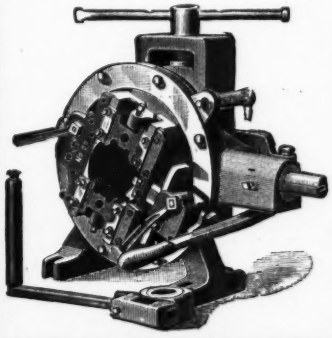

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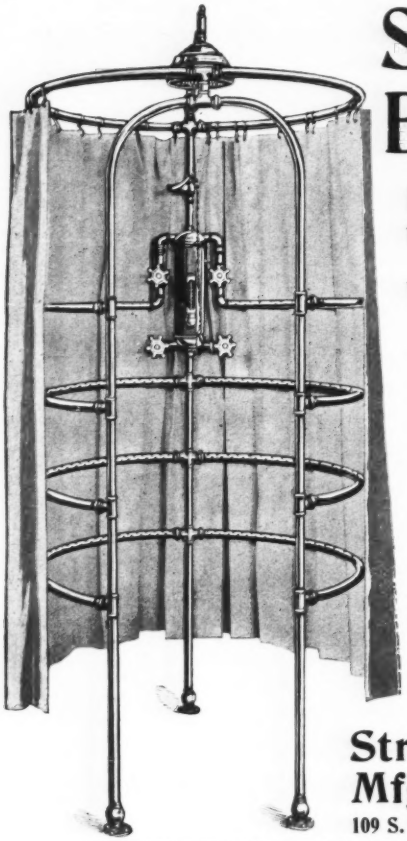

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Do we make them?

Well, we guess yes.

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High Pressure Ball Cock

CANNOT POUND.
ALWAYS CLOSES.
ACCESSIBLE.
DURABLE.

PERFECT AND GUARANTEED.

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WE ARE NOW MAKING

Enameled
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Also Sinks and Lavatories

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Don't buy 3 Pumps when one will do the work.

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Will test soil pipe, prove gas pipe, and there is no force pump made that is its equal.

No stuffing boxes; all valves are on the outside and work equally well with air or water.

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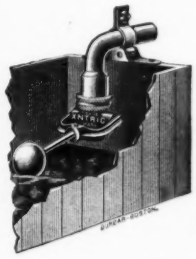
As you have been looking for it these many years.



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For High or Low Pressure

Notice size of Ball. It is only 3½ inches

Practically noiseless. Guaranteed for two years. There is positively no hammering, and the only one on the market where the valve is closed by water pressure, and which obviates all danger of accident. Been on the market and heartily approved for three years. For use with hot or cold water

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IT PAYS

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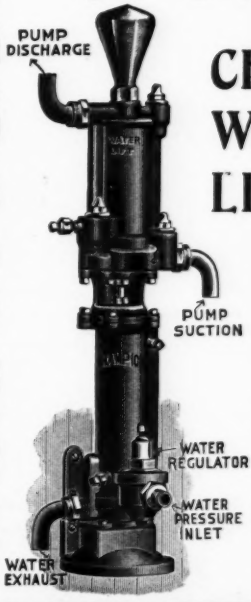

For pumping cistern water or for increasing city pressure it is the BEST.

IT WORKS PERFECTLY.

That is our guarantee, and our name is guarantee that the construction is right. Handled by all large jobbers. Write for catalog.

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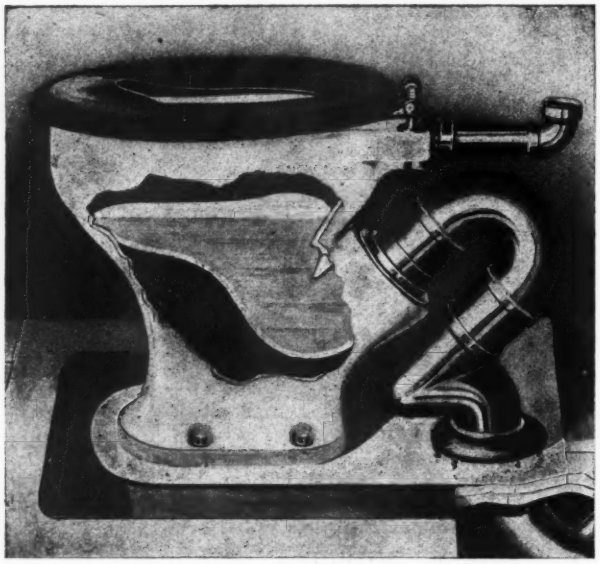
An Innovation in Water Closets



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Far Superior to Jet Closets

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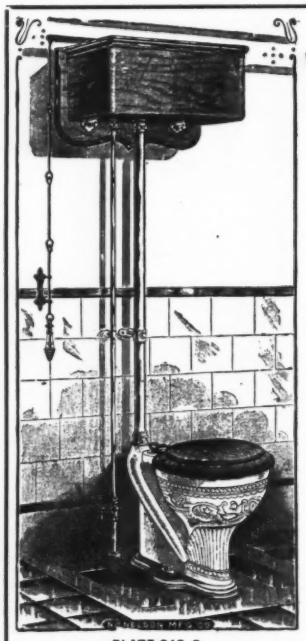

PLATE 315 C

Nelson's

High Grade Syphon Jets.

The New "Dominion"

Double Jet
Polished Wood Work
Mechanically Perfect
Absolutely Guaranteed

N. O. Nelson Mfg. Co.

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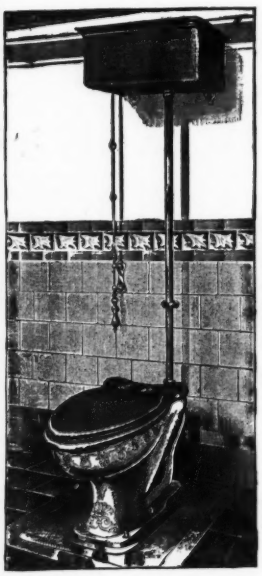

—THE—

ORINOCO

Syphon Jet Closet.

This Orinoco Syphon Jet Closet is what you should have. This is the most perfect and noiseless closet now manufactured. The workmanship and High Grade Finish of the Orinoco Closet cannot be excelled.

IT SPEAKS FOR ITSELF
TRY ONE AND BE CONVINCED.

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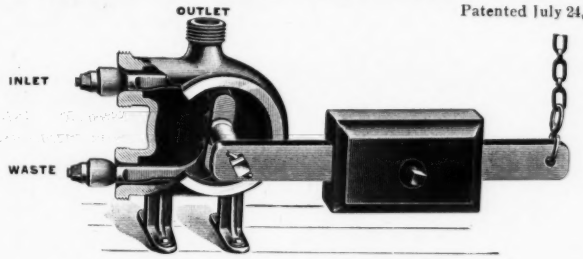
Patented July 24, 1900



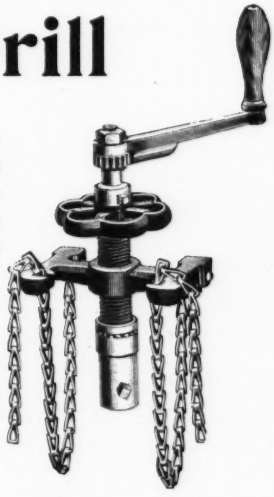
Made of best brass, has no pins or screws to work loose, or spring to get weak and break; most durable and most compact valve on the market; can be operated by chain or iron rod with seat; closes with the water pressure—when closed there is no pressure on the stuffing box—an adjustable weight regulating it to suit the amount of pressure. The only washers used on inlet and waste are two fuller balls, the top of which governs the supply and the bottom the waste; when in operation the waste is perfectly tight, so as to give closet full flow of water. From the cut it will be seen that the valve is so constructed and arranged that not a particle of water will remain in the valve casing after the flushing of the closet, having a waste the same size as the supply, therefore making it quick wasting and *frost proof*. They are made for lead pipe, and ½ inch iron pipe without extra charge. Also for ¾ inch iron pipe for after flush closets, where air compressed tanks are used. If the latter is desired so state, and add 50 cents to the list.

The S. J. Asbell Company, Paterson, N. J.

One-Piece Iron Porcelain Enameled
LAVATORIES
WITH ROLL RIMS AND OVAL BOWLS

A. Weiskittel & Son, Baltimore, Md.

Utility Ratchet Chain Drill



Not every man can afford to have every tool offered him. He must discriminate, and choose those which will do the most work. Designed to do heavy work, such as structural iron work, pipes, columns, etc.

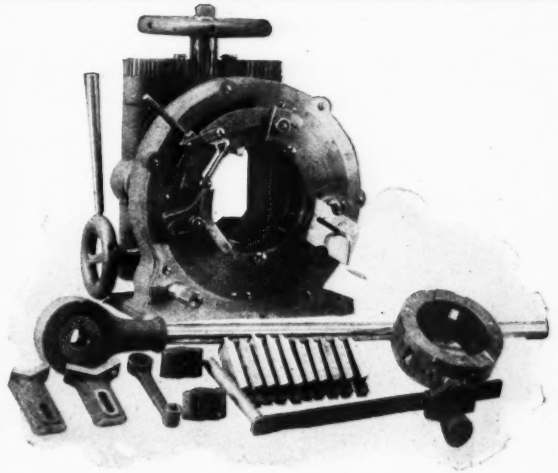
Operates either by ratchet or continuous rotary movement of handle.

Frame is made with notches, in which chains may be engaged at any point. Ball thrust bearing reduces friction. Polished parts are nickeled.

Weight 6½ lbs.; takes ½ inch shank of drill or larger.
We have other good tools, too. Write for Circulars.

DUFF MACHINE CO.

595 Middlesex St., LOWELL, MASS.



PORTABLE HAND PIPE THREADING AND CUTTING MACHINE

Has adjustable quick opening and closing die head. Can be set by graduation to any desired size. Can be released while in motion, closed instantly and positively. More rapid and accurate than any hand machine made. Gears completely enclosed from dust and chips.

Write for catalogue and prices.

THE MERRELL MFG. COMPANY

208 CURTIS STREET TOLEDO, O., U. S. A.

European Office: The Fairbanks Co., 16 Gt. Eastern St., London, E. C.

To the Plumbing Supply Trade:

No. 1. Plain Washdown

This cut represents our new improved plain wash down, which is made with walls one inch thick insuring unusual strength, thereby reducing liability of breakage to a minimum; it is therefore particularly adapted for public buildings, schools or any public place where closets are subjected to hard usage, and is designed to take the place of imported or domestic fire clay closets, and being constructed of a hard vitreous china body it is guaranteed against crazing. We can also furnish these closets with syphonic action or syphon jet.

We manufacture everything in the sanitary earthenware line and pay particular attention to specialties. All closets being tested before leaving our works, we guarantee their working qualities.

Bellmark Pottery Co.

P. O. Box 547. TRENTON, N. J.

THE REEX.

THE

KING

of them all.

Syphon Hopper
and
Trap Combined.

Surpassed by no Closet on the Market.

This closet has **full water ways** through all the **syphon pipes, a large water surface** and 3 inch Seal. It is made for high or low tank . Embossed or plain surface.

Earthenware Specialties designed and finished with unsurpassed art and workmanship.

The Sanitary Earthenware Specialty Company

Trenton, N. J.

The Dependable Kind

Oval Embossed Syphon Jet No. 64B.

is the kind you want and the kind your customers want. You KNOW you're running no risk when you get the Trenton Potteries Company's closets. You know—or you ought to if you don't—that these fixtures are the reliable sort and not the always-getting-out-of-order kind. You know that the makers guarantee them to work promptly and satisfactorily.

Have you our catalogue?

The Trenton Potteries Company, Trenton, N. J.

Finest Grades of Sanitary Earthenware and Vitrified China, Solid Porcelain Bath and Laundry Tubs, Sinks, Etc.

Do You Sell Instantaneous Water Heaters? Then

GET IN LINE

TO PUSH THE

Humphrey Crescent Instantaneous Water Heaters

We guarantee everything exactly as represented. Our prices are the **LOWEST.** If you cannot sell them, write and we will tell you how to do it and send you our new catalogue.

The Humphrey Mfg. & Plating Co.

KALAMAZOO, MICH., U. S. A.

This is our No. 8 Cresent Heater.

BEATS EVERYTHING ON THE MARKET AT ANYWHERE NEAR THE PRICE.

THE BEST ON EARTH.

Our New "Excelsior" Waste and Basin

PATENT APPLIED FOR

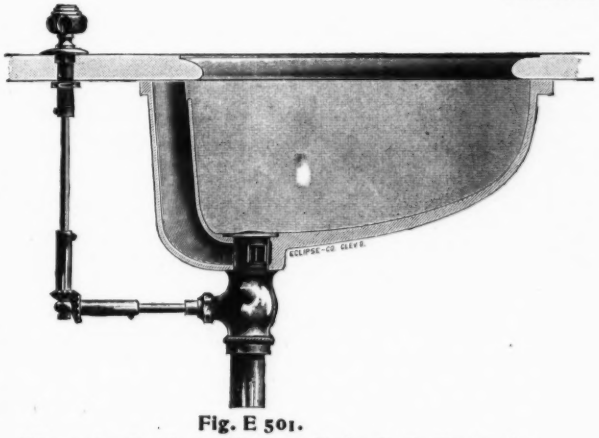


Fig. E 501.

We make the above Waste to fit the P. O. Bowls also.

THE MOST SANITARY COMBINATION ON THE MARKET.

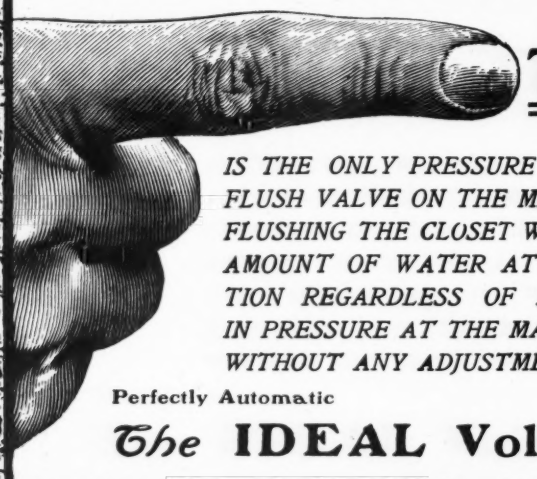
This Waste cannot get out of order as will be readily seen. **We guarantee them in every respect.**

The Basin is the only one that can be cleaned **without removing a brass strainer.**

This Basin has no strainer, still only the dirty water can pass into the overflow, which is made in such a manner as to make it easily accessible. Our new Catalog E tells you all. Have you one?

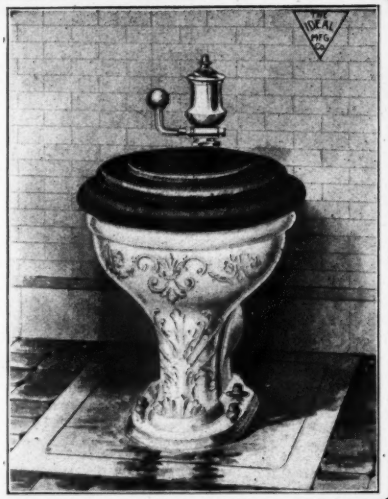
THE SANITARY COMPANY

CLEVELAND, OHIO



THAT

IS THE ONLY PRESSURE REGULATING FLUSH VALVE ON THE MARKET. FLUSHING THE CLOSET WITH THE SAME AMOUNT OF WATER AT EACH OPERATION REGARDLESS OF FLUCTUATIONS IN PRESSURE AT THE MAIN OR SUPPLY WITHOUT ANY ADJUSTMENTS.



Perfectly Automatic Patented

The IDEAL Volumeter

THE IDEAL MFG. CO. DETROIT MICH.

The IDEAL Mfg. Co.

Manufacturers of

Fine Sanitary Specialties

DETROIT MICH.

THE IDEAL MFG. CO. DETROIT MICH.

The

"Sedate"

We Handle all grades of Low Down Tank outfits, including syphon jet, syphoning hoppers with jets and plain hopper and trap combinations.

We Manufacture the "QUIET" syphon jet and the "SEDATE" syphoning hopper outfits and recommend them to all who desire a thoroughly high grade and highly perfected outfit.

The TANKS, seats and lids are made from carefully selected hard woods, which are highly finished. The "Quiet" and "Sedate" tanks have heavy tinned copper linings and all seams are locked and carefully soldered.

Haines, Jones & Cadbury Company

1128-44 Ridge Avenue
1423 Chestnut Street

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THE "GEGENSTROM"
HOT WATER APPARATUS

SCHAFFSTAEDT'S PATENT

FOR THE INSTANTANEOUS
PRODUCTION OF

WARM OR HOT WATER

BY MEANS OF STEAM.

ESPECIALLY ADAPTED FOR

RAIN BATHS

IN INSTITUTIONS,
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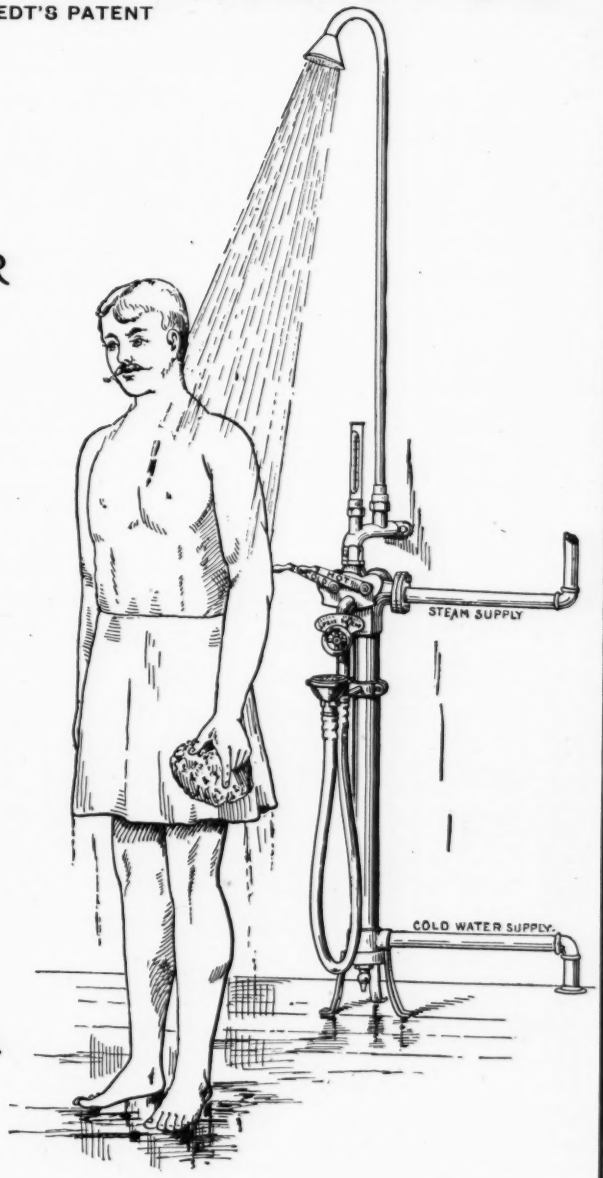
AND PRISONS,
IN HOSPITALS,
INSANE ASYLUMS,
GYMNASIUMS,
ARMORIES
AND IN
PEOPLE'S BATH ESTABLISHMENTS.



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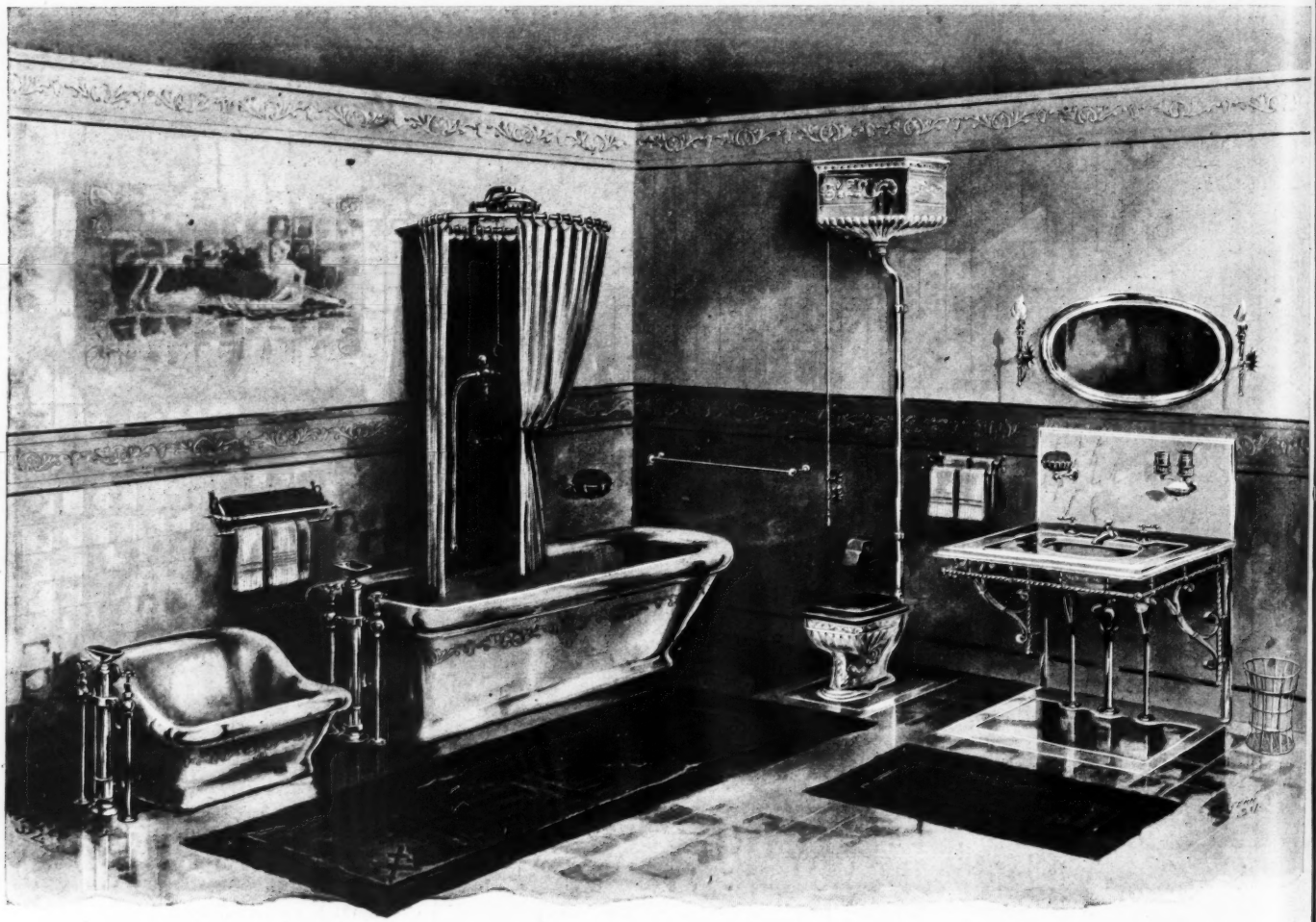
RUMSEY'S "UNA-SEAL"

BATH ROOM COMBINATION, COMPRISING



BATH.—"Una-Seal" Solid Porcelain Roll Rim Bath Tub, 5½ feet long, Class "A," with Porcelain Base to the floor, glazed inside and over Rim, exterior finished Zinc White with "Una-Seal" Decoration, Nickel-plated Low Bell Supply Fitting with Supply Pipes and "Superior" Waste, Nickel-Plated Combination Needle and Shower Bath with Rubber Lined White Curtain.

WATER CLOSET.—Square Embossed "Una-Seal" Syphon Jet Closet (Vitreous Ware) with Mahogany Seat and Cover, No. 25 Embossed Porcelain Syphon Tank, Nickel-Plated Flush and Supply Pipes, Nickel-Plated Rod and Pull Guide and Porcelain Pull. Decoration of Closet and Tank.

LAVATORY.—Italian Marble Lavatory, 34x24 inches with 16-inch Back, 14x19 D-shape Basin, Nickel-Plated "Olympian" Combination Supply and Waste Fixture, Nickel-Plated Supply Pipes, Trap and Ornamental Bracket, Nickel-Plated Soap, Tumbler, Brush and Sponge Holders, and 22x32-inch Plate Glass Mirror with Nickel-Plated Brass Frame.

SITZ BATH.—Solid Porcelain Roll Rim Sitz Bath, Class "A," with Porcelain Base to floor, glazed white inside and outside, with "Una-Seal" Decoration, Bell Supply Fitting with Brass Supply Pipes and "Superior" Waste.

L. M. RUMSEY MANUFACTURINC COMPANY

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Manufacturers of

Lead Traps — *Enameled Bath Tubs*
Lead Bends — *Lavatories*
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Sheet Lead — *Sanitary Water Closets*
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Supplies and Tools for Plumbers, Gas and Steam Fitters

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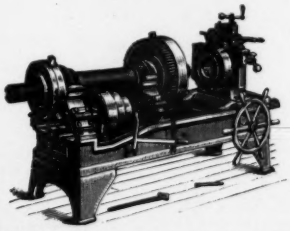


Peerless No. 4, Imp. 1 in. to 4 in.

PIPE THREADING AND CUTTING MACHINERY

To Cut from 1-8 inch to 18 inches

HAND OR POWER

Our Machines have Every Improvement for Accurate and Rapid Work.

Bignall & Keeler Mfg. Co., Edwardsville, Ill.

Agents: CHARLES CHURCHILL & CO., Ltd., LONDON. DeFRIES & CO. ACTIENGESELLSCHAFT, DUSSELDORF. AKTIEBOLAGET VERKTYGSMASKINER, STOCKHOLM.

"Repeat it to yourself,
write it down,
do not forget,
but remember,
remember,
remember that advertising is
the news of business,
that good advertising is good
news,
that good news finds listening
ears."

CHARLES MILLAR & SON COMPANY

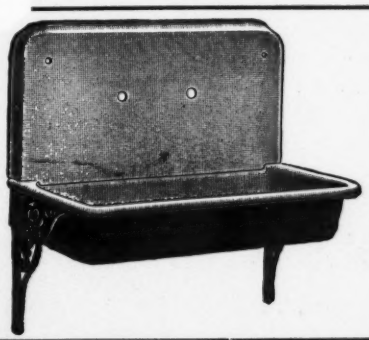
SELLING AGENTS, UTICA, N. Y.

UTICA PIPE FOUNDRY CO.

CAST IRON PIPE

And Specials for Water and Gas. Wholesale Eastern Agents AKRON VITRIFIED SEWER PIPE.
Flanged Pipe and Fittings, Hydrants, Gates, Pig Lead, Jute, etc.
Manufacturers of Lead Pipe, Solder, etc., and Jobbers of Plumbers' and Tinners' Goods.

"The Cast Sink Must Go"



"Columbus" and "New Era"

Wrought Steel Sinks.

ROLLED RIM AND FLAT EDGES.

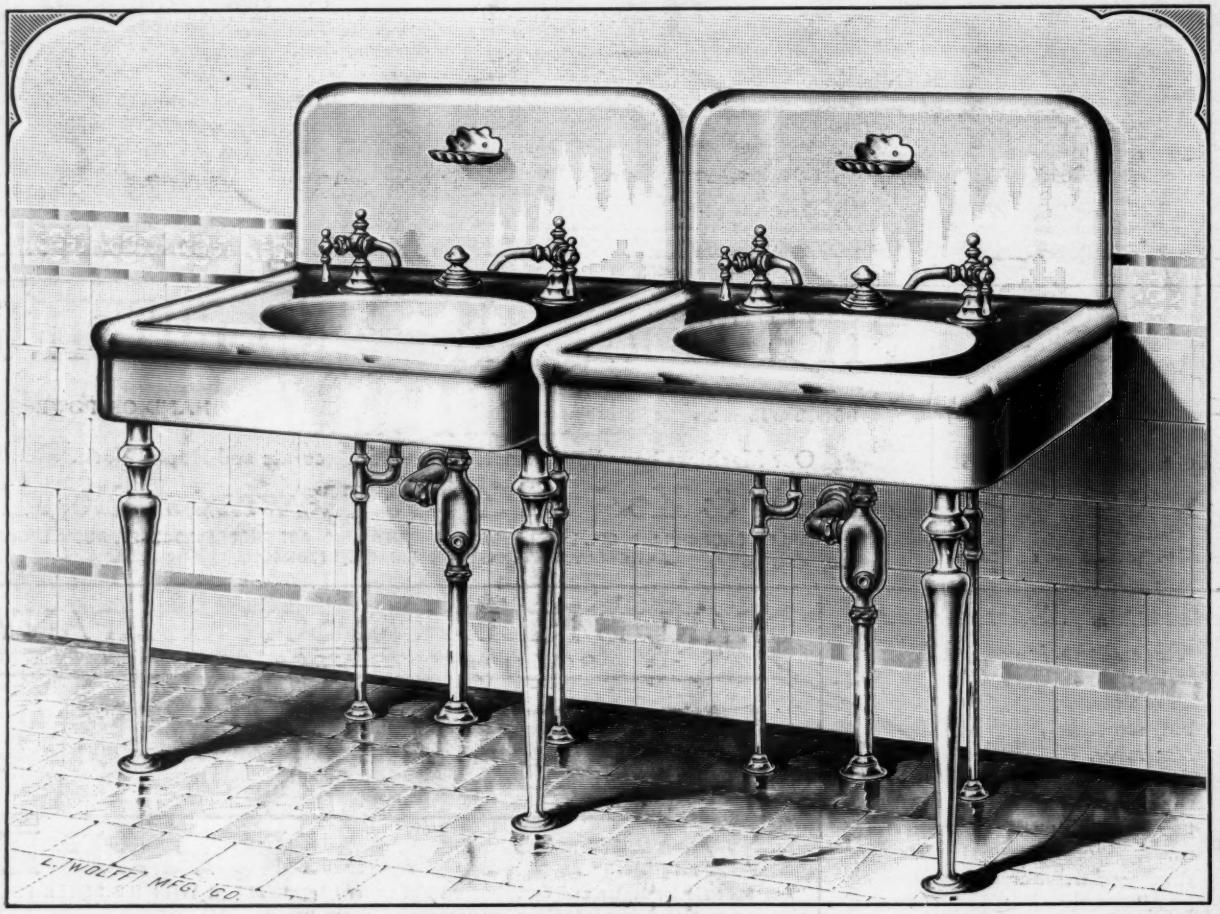
Painted, Galvanized, Blue Enameled,
Grey Enameled, White Enameled.

Write for Catalogue and Prices...

The Kilbourne & Jacobs Mfg. Co.,
COLUMBUS, OHIO.

WOLFF'S ENAMELED IRON LAVATORY

F-1438



The above cut shows our F-1438 Enameled Iron Apron Lavatory as set in battery —**Each Lavatory having slab, bowl, and apron cast in one piece,** 12 in. high back and enameled iron legs—Nickel plated No. O Traps and supplies to floor—Nickel plated Ideal Basin Waste and Nickel plated Basin Cocks.

We have a complete line of samples at our Show Room, 91 Dearborn Street and will be pleased to furnish illustrated circulars and information on application.

L. WOLFF MANUFACTURING CO.

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